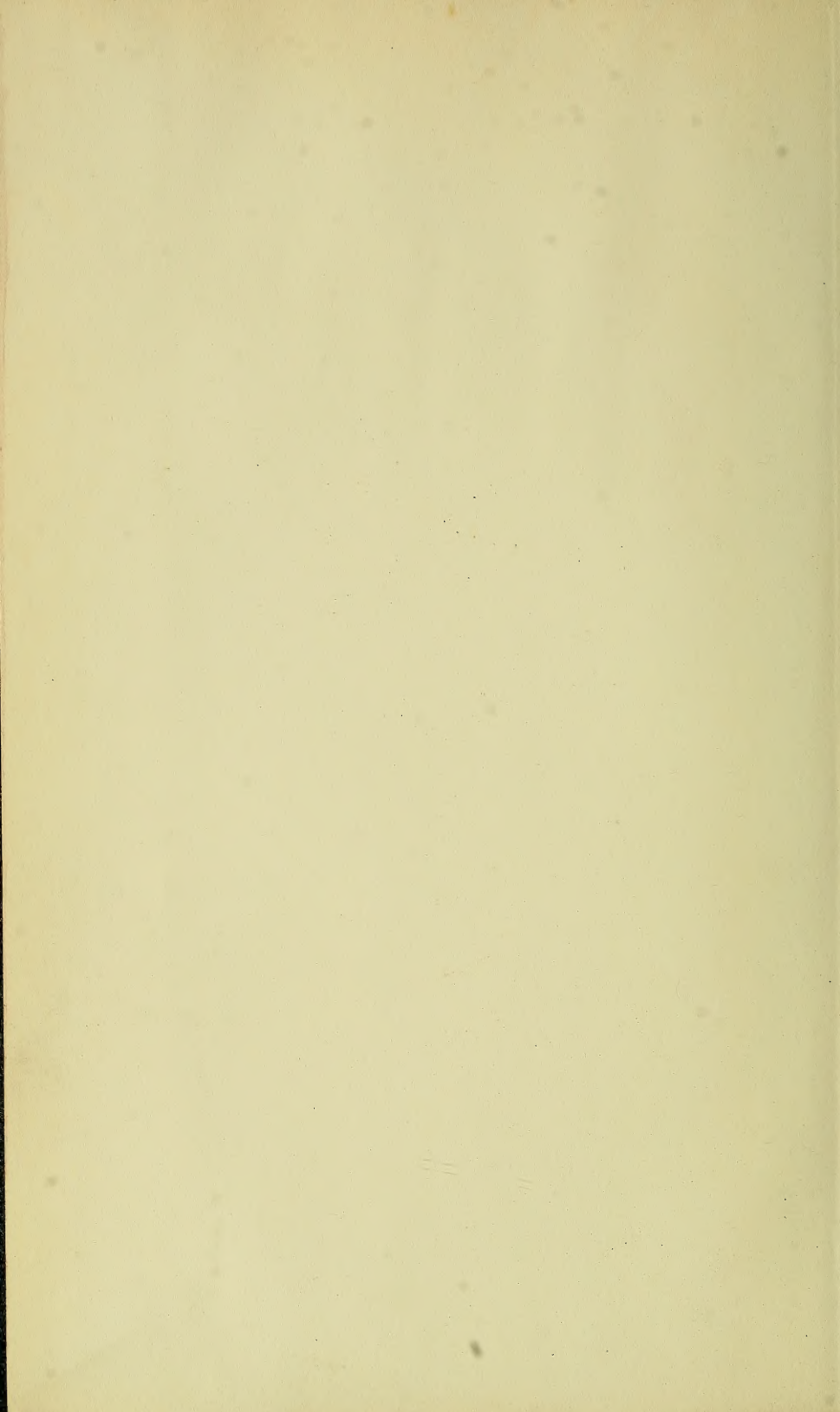
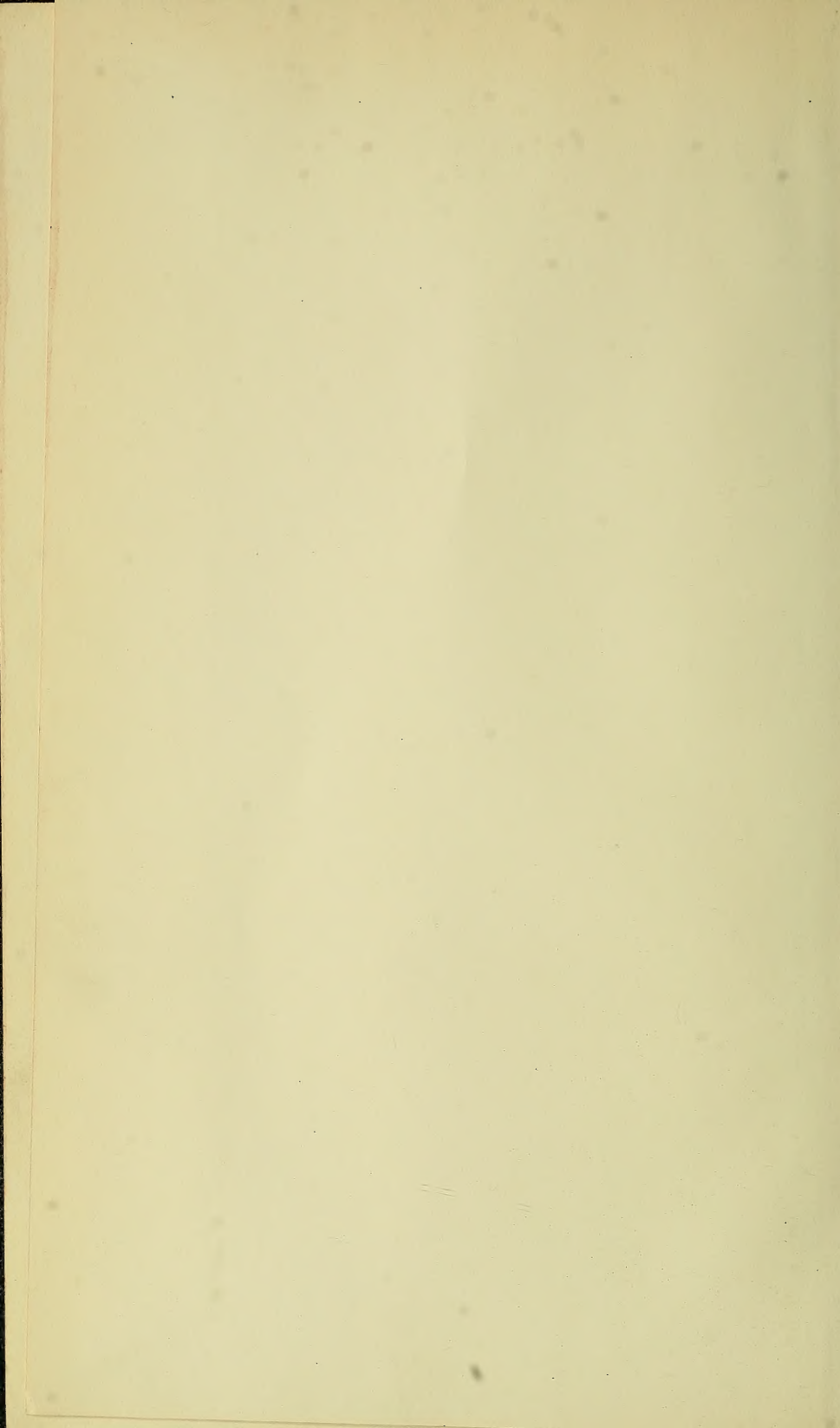












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University of the State of New York Bulletin

Entered as second-class matter August 2, 1913, at the Post Office at Albany, N. Y.,
under the act of August 24, 1912

Published fortnightly

No. 606

ALBANY, N. Y.

JANUARY 1, 1916

New York State Museum

JOHN M. CLARKE, Director

EPHRAIM PORTER FELT, State Entomologist

Museum Bulletin 180

30th REPORT OF THE STATE ENTOMOLOGIST

ON

INJURIOUS AND OTHER INSECTS

OF THE

STATE OF NEW YORK

1914

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ALBANY

THE UNIVERSITY OF THE STATE OF NEW YORK

1915

THE UNIVERSITY OF THE STATE OF NEW YORK

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The University of the State of New York
Department of Science, April 8, 1915

Dr John H. Finley

President of the University

SIR: I have the honor to transmit herewith the manuscript and illustrations of the Report of the State Entomologist for the year 1914 and to recommend that this be published as a bulletin of the State Museum.

Very respectfully

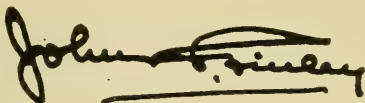
John M. Clarke

Director

THE UNIVERSITY OF THE STATE OF NEW YORK

OFFICE OF THE PRESIDENT

Approved for publication this 19th day of April 1915

A handwritten signature in dark ink, appearing to read "John H. Finley". The signature is written in a cursive style with a long horizontal line extending from the end of the name.

President of the University

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New York State Museum

JOHN M. CLARKE, Director

EPHRAIM PORTER FELT, State Entomologist

Museum Bulletin 180

30th REPORT OF THE STATE ENTOMOLOGIST 1914

Dr John M. Clarke, Director of the State Museum

I have the honor to present herewith my report on the injurious and other insects of the State of New York for the year ending September 30, 1914.

The extended injuries by the apple tent caterpillar and the forest tent caterpillar, noted last year, were continued during the past season. The work of the latter species was particularly evident on Long Island and in the Adirondacks. Popular warning notices were sent early to the press, and at Westbury and Elizabethtown power spraying outfits were used most successfully against the forest tent caterpillar. The ten-lined inch worm was locally abundant in the Catskills and in Washington county.

Oil injuries. The serious results following the application of petroleum compounds to the bark of dormant trees, noted in earlier reports, have again come under observation the past season. One of the most interesting of these was at Dalton, Mass., and resulted from the application in May 1913 of burlap strips soaked in lubricating oil to sugar maple trees set some ten or eleven years previously. The Entomologist has also examined a number of fruit trees in widely separated orchards where conditions favored the belief that the serious condition of the trees was due to an earlier application of a miscible oil.

Fruit tree pests. The studies of the parasitic enemies of the San José scale, begun in 1913, have been continued during the past year and have resulted in the finding of a number of orchards where these beneficial forms were abundant and apparently very effective

agents in checking this pest. The most efficient species is the recently discovered and newly characterized *Prospaltella perniciosi* Tower, a form which is widely distributed in certain sections of the State, at least. In spite of the abundance of these natural enemies we believe that, as a rule, fruit growers must continue to rely upon the application of lime-sulphur washes for the control of this scale insect.

Field studies of red bug injury have shown that in the Hudson valley, at least, the lined red bug, *Lygidea mendax* Reut., is the species responsible for most of the damage to the fruit. Orchard experience indicates that a nicotine preparation, such as black leaf 40, is one of the most effective sprays. It is probable that in the case of badly infested trees, a special application of nicotine and soap must be made somewhat later than it would be safe to use the lime-sulphur wash at winter strength.

The pear thrips continues to be a serious pest of the grower in the Hudson valley, appearing here and there in a most erratic manner and injuring Seckle and Bartlett trees, in particular. Observations show that orchards practically free from the pest one season may be seriously affected the next. A detailed account of this insect is given in the report for 1912. In at least one instance pear midge injury, supplementing the damage caused by the thrips, resulted in an almost total loss of the crop.

The pear psylla has continued its rôle as a serious enemy of the grower, being particularly abundant and injurious in certain extensive orchards in the vicinity of Milton and Marlborough. The practical value of late spring applications of a lime-sulphur wash for the control of this insect was demonstrated earlier, and observations in the above-mentioned orchards showed the necessity of carefully eliminating artificial shelters such as stone walls, brush heaps and even check trees if the best results are to be secured.

The banded grape bug, *Paracalocoris scrupeus* Say, noticed in detail in the report for 1913, has continued its injurious work. Through the cooperation of Mr L. F. Strickland of the State Department of Agriculture, a series of nymphs were received and detailed descriptions of the early stages are included in this report.

Gipsy moth. One of the worst infestations of the gipsy moth yet discovered in this State, was located last spring, through the cooperation of Mr F. A. Bartlett, at Mount Kisco. The infestation was of several years' standing and a few egg masses were found at a considerable distance from the center of the colony. Prompt and

vigorous action by agents of the Department of Agriculture has resulted in nearly exterminating this menace, and it is most earnestly hoped that in another year or two this outlying colony will be utterly destroyed.

Brown-tail moth. A scattering infestation of the brown-tail moth was discovered early in the year on Fisher's island and the eastern end of Long Island. The pest very probably drifted with the winds from the adjacent infested mainland of Connecticut. Systematic scouting and the destruction of over-winter nests by agents of the State Department of Agriculture and the Federal Government have prevented extended multiplication the past season. The abundance of oak on Long Island renders it very probable that this pest will breed freely unless checked artificially. The prevalence of this insect in large numbers would mean an inevitable drop in the high land values prevailing in that section. The Entomologist, co-operating with other local and State agencies, is endeavoring to arouse a general interest in the control of this insect while the infestation is in an incipient stage.

Grass and grain pests. There was an extended and serious outbreak of grasshoppers on the border of the Adirondacks, portions of Fulton, Saratoga and Warren counties, in particular, suffering greatly. Warning notices giving directions for checking the pests were issued before the situation was serious, and later at the request of the Governor, the Entomologist made a special study of the problem. and in cooperation with agents of the State Department of Agriculture, conducted a most satisfactory demonstration of the efficiency of poisoned baits. The grasshoppers of the State have been carefully studied in this connection and a detailed account of these insects, their capacity for harm and control measures are given on following pages.

There were numerous local and, in some instances, severe injuries by army worms in mid July and early August. These outbreaks invariably arouse considerable apprehension because of the masses of caterpillars, though as a rule the damage is restricted to comparatively small areas. The work of the past season demonstrated the utility of poisoned baits similar to those employed against grasshoppers. Newspaper bulletins giving full information respecting this insect and methods of control were issued at the inception of the attack.

Studies of white grubs and June beetles begun in 1912 were continued, one of the most interesting developments being the rearing of a number of a rather scarce robber fly, *Promachus*

fitchii O.S., from the large, white maggots observed in association with and preying upon white grubs during both 1912 and 1913. Observations were also made upon the numbers and injuries by the beetles, and late in the season upon the abundance of small white grubs, which latter when numerous invariably cause serious injury the following season. Local conditions were characterized in brief, practical accounts sent to papers circulating in sections where these pests were most abundant.

Grass webworms were prevalent and injurious to a number of cornfields in Dutchess county. Control measures, as has been demonstrated by earlier work, must be restricted largely to planting immune crops on badly infested land. These small insects are by preference grass feeders and, under normal conditions, may become exceedingly numerous on land allowed to lie in grass for a number of years. An interesting and rare type of injury was also observed in one of the infested fields. It was caused by a small, yellow field ant, probably *Solenopsis debilis* Mayr., eating out the contents of the kernel, and the corn sprout, thus deprived of its normal nourishment, developed very slowly. Brief accounts of these insects are given in this report.

Shade tree insects. Injuries by the elm leaf beetle continue as in previous years, though local restrictions are perhaps fully as marked as in earlier seasons. There was a great decrease in this pest in 1912, due, as we then believed, to abnormally low temperatures in mid June, and the same phenomenon, though to a somewhat less extent, was observed last season. The beetles appeared in large numbers, deposited eggs freely, and yet the subsequent damage was much less than would be expected from the early indications. Checks of this kind are temporary, more or less local and unreliable, as a rule.

The spruce bud scale, *Physokermes piceae* Schr., is a comparatively unknown pest in New York State. It has been found during the last two or three years in widely separated localities and appears to be responsible for some of the dying branches so frequently seen upon healthy trees. A somewhat detailed discussion of this insect is given on a following page.

The Norway maple, hitherto regarded as comparatively free from insect pests, has been shown by the developments of the past season to be subject to attack by a leaf hopper, *Alebra albostrigella* Fall., and a scale insect, *Leucaspis japonica* Ckll., the former apparently very serious at times and the latter somewhat resembling

the common scurfy scale of the apple. Both of these pests are noticed elsewhere in this report in some detail.

Forest pests. The hickory bark beetle still continues as an important pest in the vicinity of New York City, and here and there in the Hudson valley, though the resultant damage does not appear to be so extensive and severe as in earlier years. It is to be expected that natural enemies will soon begin to regain the ascendancy, which already seems to be the case to a limited extent. It is undoubtedly true that conditions have also been materially benefited by the somewhat general cutting and burning of badly infested trees.

The establishment of the recently introduced bayonet or posthorn pine borer, *Evetria buoliana* Schiff., in several New York localities adds another potentially important enemy to our list of pine pests. This European species has evidently been established in the country for several years, probably being brought here with nursery stock. The infestation is so limited that there is a possibility of exterminating the borer. A detailed account of this insect is given on subsequent pages.

The maple and oak pruner, a rather common enemy of oaks, in particular, has been unusually abundant and injurious, especially in the lower Hudson valley and, as a consequence, many inquiries have been received concerning this insect and methods of control. A brief practical account of this borer is given elsewhere.

The large European hornet, *Vespa crabro* Linn., became established in this country several years ago, and during the last year or two has attracted notice by its habit of removing the bark from small, living twigs or branches, birch suffering, in particular. Ordinarily this damage does not amount to much though it might be considered serious in the case of specimen trees or shrubs on lawns. A brief account of this insect is given in this report.

Garden or greenhouse pests. The large, brilliantly colored Say's blister beetle, *Pomphopoea sayi* Lec., has again attracted notice because of its unusual abundance in various localities in the State. The depredations of the past season were noteworthy, in that this insect was reported as having threatened with destruction the yield from an acre of beans.

Another unusual outbreak was that of the Juniper plant bug, *Chlorochroa uhleri* Stal., a stout, greenish, pink-margined stink bug which became excessively abundant and injurious at Quaker Street, Schenectady county. These bugs, ordinarily rare, were so numerous as to destroy many of the young peas while still in the pod and seriously affect the yield of several garden crops. Living speci-

mens were forwarded to the office and the Entomologist was able to confirm by actual observation, reports of injury to both corn and tomatoes.

The orchid *Isosoma*, *I. orchidearum* Westw., is rarely brought to the attention of the economic entomologist, partly because of its scarcity and probably also on account of the fact that orchid growing is a highly specialized and therefore fairly well-understood business. Pseudo-bulbs of orchids infested with this insect were received from Mount Kisco last July and later in the season orchid roots infested with the *Cattleya* midge, *Paralello-diplosis cattleyae* Moll., were transmitted by another person. Both of these insects affect the vitality of the plants and are briefly noticed elsewhere in this report.

Flies and mosquitos. The interest in the control of the house fly has continued, and early in the season the Entomologist prepared a brief folder concerning the house fly. This was widely circulated in a monthly bulletin of the State Department of Health and also issued as a separate.

Practical control of mosquitos has received its due share of attention, the Entomologist personally investigating a peculiar problem on the shores of Sodus bay. The investigations started the past season will be continued another year in an attempt to abate the mosquito plague associated with swamps lying practically at lake level.

Gall midges. The European box leaf miner, *Monarthropalpus buxi* Lab., has become well established on Long Island and is seriously injuring box hedges, since many badly infested leaves drop and the plants soon become very scraggy. A series of experiments have shown the practicability of destroying these miners while still within the plant, by the use of fumigants, carbon bisulphid being the most promising of these materials. A detailed account of this insect is given on subsequent pages.

Studies in this group (Itonididae) have been continued and a number of new species, mostly reared, and several new genera described. There have been a number of important additions in this group to the New York fauna. The American zoophagous species, mostly beneficial because of their preying upon other forms, especially scale insects, plant lice and plant mites, have been tabulated. This compilation shows a possible importance as natural checks hitherto scarcely suspected.

Lectures. The Entomologist has delivered a number of lectures upon insects, mostly economic forms, before various agricultural

and horticultural gatherings, some of them being in cooperation with the bureau of farmers institutes or county farm bureau agents. Several lectures have also been given under the auspices of local improvement associations.

Publications. A number of brief popular accounts regarding such common pests as the house fly, apple and forest tent caterpillars, the elm leaf beetles and June beetles, have been widely circulated through the press. The more important publications of the year are the Gall Midge Fauna of New England and several papers describing new genera and species of gall midges.

Faunal studies. The investigations of earlier years along these lines have been continued and there is now in manuscript a list of the insects of the Adirondack region, based mostly upon material in the State collections. There was some special collecting in the Adirondacks in connection with the investigation of grasshoppers noted above, and Assistant State Entomologist Young continued his studies of the fauna at Wells, paying attention to the hitherto largely neglected Mycetophilidae and obtaining a number of new species, and also of known forms not previously recorded from the State.

Collections. A large series of insects was obtained by purchase from the Kny-Scheerer Company of New York. These are for the exhibit collection now being prepared and were selected primarily because of their value in supplementing or elucidating the material already at hand. The similarities obtaining among insects in different sections of the world, the remarkable developments in certain highly specialized forms, and the enormous size of some species are well illustrated in these recent acquisitions.

Through exchange with Mr C. W. Johnson of the Boston Museum of Natural History, the State Museum has acquired a series of 83 species (listed elsewhere) of two-winged flies, mostly unrepresented in the collections. These being determined by a well-known authority in the group, constitute a notable addition to the State collections.

We have been fortunate in receiving, through exchange, from Prof. S. I. Kuwana of the board of plant inspection, Imperial Ministry of Agriculture and Commerce, Tokio, Japan, specimens of 30 species of Coccidae, a number of them representing species described by Professor Kuwana and therefore particularly desirable.

Accessions, such as the above, add greatly to the value of the State collections, especially when the group is economically important, as is the case with the Coccidae or scale insects. There have been numerous additions during recent years in this family. Miss F. T.

Hartman was assigned the duty of assembling and listing the species now represented in the State collections. The list reproduced on subsequent pages shows that we now have 181 species, 72 of which have been mounted on microscopic slides, 4 being represented only by such preparations. There are 41 species from Japan, 28 from California, 7 from the Philippine islands and 9 types and 7 cotypes. This assemblage is a most valuable aid in determining scale insects so frequently submitted for name. The Coccidae are so readily transported with nursery stock, that species of extralimital forms are very desirable. Only last summer there was found on Norway maple, a Japanese species which may prove of considerable economic importance.

Additions are constantly being made to the State collections, especially of specimens representing the early stages and work of various injurious forms, since biological material of this character greatly facilitates identification of the different insects and is indispensable in a well-prepared exhibit illustrating the life histories of different species. The State collection now contains a large amount of material which is invaluable because of the associated data. Many microscopic preparations of smaller insects have been made and incorporated in the collections as in earlier years.

The arrangement and classification of the collections requires a large amount of time. The many additions must be interpolated and there are numerous groups still far from being thoroughly classified. The large series of *Lachnosterna* captured during the past summer were determined by Mr Young. The collection of grasshoppers taken in connection with the grasshopper investigations referred to above, necessitated the rearrangement of the Orthoptera by Mr Young.

The need of additional boxes or trays referred to in the previous report still exists. The wooden cases containing the insect collections should be replaced by steel cabinets and more provided to accommodate the extra boxes and trays required. No adequate provision has as yet been made for the constantly increasing biological material, which is also true of the large number of microscopic slides, many of them containing types of species and genera and therefore impossible of duplication. A metallic filing case for the collection of negatives and photographs is also greatly needed.

Nursery inspection. The nursery inspection work of the State Department of Agriculture results in numerous specimens representing any stage in insect development, some in a very poor condition, being submitted to the Entomologist for identification. As such

material may originate in a foreign country, determinations of this character are laborious and require for their successful prosecution a large collection and an excellent library of both domestic and foreign works. The correct identification of such material is very important, since the disposal of entire shipments of nursery stock must depend in considerable measure upon the character of the infestation.

General. The work of the office has been materially aided as in past years, by the identification of a number of species through the courtesy of Dr L. O. Howard, chief of the bureau of entomology, United States Department of Agriculture, and his associates. A number of correspondents have donated valuable specimens and many have rendered efficient service by transmitting local data respecting various insects. It is a pleasure to note that there has been, as in the past, a most helpful cooperation on the part of all interested in the work of the office.

Respectfully submitted

EPHRAIM PORTER FELT

State Entomologist

October 15, 1914

INJURIOUS INSECTS

LINED RED BUG

Lygidea mendax Reut.

The observations of the past season show this species to be common and rather generally distributed in the Hudson valley and the one usually responsible for the increased red bug injury to apple orchards. A number of field studies were made for the purpose of securing data which might be of value in controlling the pest.

Examinations of northern spy and greening trees in the orchard of Mr W. H. Hart, at Arlington, on May 14th showed a rather general infestation. The young bugs were evidently just hatching, as some of them were of a pale yellowish red color, while a few were beginning to show the characteristic deep red. The more tender unfolding leaves were indistinctly reddish-brown spotted here and there, and presented somewhat the appearance of having suffered from sun scald. Such injury was almost invariably closely associated with the presence of one or more small red bugs. Eleven days later, evidences of injury were more marked and the young bugs were mostly in the second stage, a few apparently just entering the third. On June 25th adults of this species were commonly present throughout the orchard, two or three being easily found on many of the trees. A number were captured and in no case were we successful in securing specimens of the other red bug, *Heterocordylus malinus* Reut. They all belonged to the above named species. It was found that the adults could be rather easily caught by holding a hat just below the insect and then jarring the foliage from above. It was necessary to move rather quietly and quickly and just after the jarring be ready to knock the bug back into the hat or it would escape. Some quickness and care are necessary to capture the specimens without crushing them badly. By July 16th there were comparatively few red bugs to be found in this orchard, though the insects had been numerous a short time before and occurred at that time rather abundantly in one orchard only about a mile away.

Examinations of various orchards in the Hudson valley resulted in our finding numerous evidences of the work of this insect, and in a number of cases adults were taken, they in each instance proving to be the lined red bug. In addition to infesting a number of orchards near Poughkeepsie, the species was found to be rather nu-

merous at Bangall and also at Milton, Ulster county. Similar conditions, though without excessive injury, were observed in localities in both Columbia and Rensselaer counties. Specimens were received from a Washingtonville, Orange county, orchard and also from Mount Vernon, Westchester county. The general distribution of this insect in this apple-growing region is favorable for serious and sporadic injury, such as has obtained at Poughkeepsie for the last two or three years. If the grower would avoid a heavy loss it is necessary to watch this pest and prevent its becoming excessively abundant.

Signs of red bug injury. The earlier signs of damage by this species are found in the indistinct reddish brown spotting of the more tender opening or recently unfolded leaves. This discoloration has been compared to the appearance presented after a light dusting with red pepper. As the injured leaves age the discoloration becomes somewhat darker and after a time the central portion of the more seriously affected tissues may die and drop, leaving an irregular series of reddish, brown-margined holes in the somewhat curled, crumpled leaves. Affected foliage, unless very badly injured, usually remains upon the tree throughout the summer and affords one of the readiest means of detecting the work of this pest. The damage to the foliage, while of some consequence, amounts to little compared with the injury to the young fruit.

The earliest evidence of injury to the small apple is a slight exudation accompanied by a local discoloration and hardening. The young fruit is frequently pierced to the core and as growth continues, depressions with pithy centers extending deep into the tissues may be noted. There is also a marked irregularity in the shape of the apples. This damage may be distinguished from somewhat similar appearing aphid injury by the fact that the blossom end is not puckered or deformed, a modification frequently following plant louse attack. Many apples are dwarfed and drop about midsummer.

The red bugs themselves rarely attract notice, though the young, which are bright in color, shelter themselves largely in curled leaves and may generally be found near the tips exhibiting the characteristic injury. The adults are about a quarter of an inch long, reddish in color, and likewise are most often found near affected foliage. This lined red bug may be separated from the sometimes associated true red bug, by the black line along the posterior margin of the pronotum, while the other is distinguished by the rather numerous fine, whitish scales on the head, thorax and wings. Both young and adults are active and are very likely to dodge to the other side of a leaf or twig when approached.

Remedial measures. Experiments and practical experience have shown that many of these insects can be destroyed with a tobacco preparation, 40 per cent nicotine used at the rate of three-fourths of a pint to 100 gallons of water. This may be applied as a separate spray to which 5 or 6 pounds of soap are added to increase the spreading properties, or it may be put into either the usual lime-sulphur, San José scale or codling moth sprays. If the latter is done, it is advisable to delay the winter application for San José scale as late as possible, in order to catch the young bugs hatching just before the blossoms break from the bud, and then to spray for the codling moth just as soon as practical after the blossoms fall. Last year Mr W. H. Hart added the tobacco to the usual lime-sulphur and arsenate of lead spray, making the application as soon as practical after the dropping of the blossoms. This work was done under our supervision, May 25th, at a time when the young bugs were mostly in the second stage, a few just entering the third. Examinations showed that some of the insects were destroyed by this treatment, though not all, because living red bugs were found in the orchard later. Mr Hart was of the opinion that great numbers of the pests were killed by the nicotine, which is undoubtedly true. Special spraying for this insect is particularly advisable when there is a light crop, since the grower, under such conditions, can not afford to have many apples deformed. In cases of bad infestation, especially in extensive orchards, it will probably be necessary to make a special spraying with nicotine and soap somewhat later than it would be safe to use the lime-sulphur wash at winter strength, and then to supplement this by as early spraying for codling moth with nicotine added as practical.

WHITE GRUBS AND MAY OR JUNE BEETLES

The white grub outbreak in 1912 was so severe and general in Albany, Columbia and Rensselaer counties as to arouse much interest in the pest and in practical methods of preventing serious damage. The trouble of that year, as has been explained repeatedly, had its inception in a large flight of May or June beetles in 1911 and the depositing of their eggs in many of the best mowings. White grubs were consequently so abundant the next season (1912) as to gnaw off most of the grass roots so that mowing machines and horse rakes frequently tore up large areas of what should have been vigorous and productive grass land.

The outbreak of 1912. Aside from the damage caused, it was considered advisable to watch developments for the purpose of securing additional data which might prove of value in practical control

work. At the outset it should be stated that these grubs, at the time the injury was most apparent, were about a year old. They had hatched from eggs laid the preceding June and were destined to live a second winter as grubs and change to beetles in August or September 1913. The adults, though fully developed in late summer or early fall of that year, did not appear above ground till May and June 1914.

A number of sample diggings were made in the spring of 1913, for the purpose of ascertaining the conditions of the insects and the relative mortality. Numerous full-grown grubs were found, as many as nine being uncovered in an area of approximately one and one-half square feet. A few adults of *Lachnosterna fusca* Froh. occurred with the white grubs and there is a possibility that some individuals of this species may complete the life cycle in two years, though the developments of the past season (1914) conclusively establish a three-year cycle as the normal.

The most interesting development was the discovery of numerous large *Dipterous* maggots in 1912. These preyed upon the white grubs and were carried through the season of 1913, and adults were secured in the spring of 1914, showing the species to have, like its host, a three-year life cycle. This efficient enemy of the white grubs proved, upon rearing, to be a common robber fly known as *Promachus fitchii* O. S.

Observations in 1914. The abundance of beetles in 1911 and the occurrence of many white grubs in the soil in 1912 and early the following season, made it comparatively safe to predict a large flight for this year. About May 14th, the beetles began to be abundant in and about Nassau, and on the 16th to the 18th they were common on the streets and reports of unusual numbers began to be received. Similar conditions were noted at Clinton Heights and on the Capitol grounds at Albany. Collections May 19th at Nassau resulted in taking in the early evening *Lachnosterna fraterna* Harr. almost exclusively from bushes on low ground near a stream, while later in the evening almost equal numbers of this species and *L. fusca* Froh. were collected under electric lights somewhat remote from the above-mentioned low ground. There were marked differences in the abundance of the insects about various lights, even in cases where there were approximately equal areas of grassland near by, though in a general way the pests were more abundant around the outlying village lights.

The feeding of the beetles, while injurious to trees, may be taken advantage of to some extent to indicate the approximate amount of injury which may be expected from the grubs the following season.

A considerable variety of trees are subject to attack by May and June beetles, the following list giving the trees in about the order of their preference by the beetles, so far as southern Rensselaer county is concerned: oak, ash, hickory, butternut or black walnut (both are probably equally susceptible), elm and birch. The sugar maple appears to be almost exempt from injury. Trees standing by themselves in pastures or grasslands or on the edges of mowings showed the most severe injury, and the damage was frequently confined largely to the sides next the sodland. The feeding in the case of large trees standing by themselves was most marked on the outer portions and especially the tops of the trees, indicating that the beetles as they emerged from the grass flew moderately high and confined themselves largely to the more tender outer foliage. A number of oaks, in particular, were so badly injured that practically all the leaves were destroyed on the upper two-thirds of the branches, while the remainder were almost uninjured. The concentration of attack upon the tops of the trees is also noteworthy in woodlands. This injury was so severe in a number of places that farmers were of the opinion that the tops of some trees, at least, had died as a result of the attack. This injury, so far as the agriculturist is concerned, is much less important than the damage caused by the white grubs. The amount of feeding on forest trees, as pointed out above, is significant as an index for approximating the probable abundance of white grubs the following season.

Captures of *Lachnosterna* and associated species

	ALBANY		NASSAU			BOSTON CORNERS	BRONX- VILLE	ORIENT	HOLLIS	Totals
	May 31	June 2	May 19	June 2	June 9	June 10	June 7, 10	June 25	May 30	
<i>Lachnosterna</i> ¹										
<i>fusca</i> Froh.	34♂	17♂	29♂	17♂	7♂	.....	11♂	.....	22♂	137♂
	24♀	27♀	...	27♀	5♀	.....	36♀	6♀	8♀	133♀
<i>fraterna</i> Harr.	31♂	4♂	36♂	4♂	...	2♂	1♂	.....	.....	78♂
	13♀	6♀	15♀	6♀	...	.....	.....	.....	.....	40♀
<i>hirticula</i> Knoch.	3♂	.....	.....	.....	.....	.....	93♂	16♂	10♂	122♂
	1♀	.....	.....	.....	.....	.....	40♀	16♀	7♀	64♀
<i>crenulata</i> Froh. ....	.....	.....	.....	.....	.....	.....	2♂	.....	.....	2♂
<i>arcuata</i> Sm. ....	.....	.....	.....	.....	.....	.....	1♀	.....	.....	1♀
<i>micans</i> Knoch. ....	.....	.....	.....	.....	.....	.....	12♂	.....	.....	12♂
<i>tristis</i> Fabr. ....	.....	.....	.....	.....	.....	.....	1♀	.....	.....	1♀
	.....	.....	.....	.....	.....	.....	.....	25♂	.....	25♂
<i>dubia</i> Sm.	1♂	.....	.....	.....	.....	5♂	.....	90♀	.....	90♀
	.....	.....	.....	.....	.....	2♀	.....	19♂	.....	25♂
<i>barda</i> Horn. ....	.....	.....	.....	.....	.....	.....	1♂	12♀	.....	14♀
<i>Ligyris</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	1♂
<i>relictus</i> Say. ....	.....	.....	.....	.....	.....	.....	3	.....	1	4
<i>Diploptaxis</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>liberta</i> Germ. ....	.....	.....	2	.....	.....	.....	2	.....	.....	4
<i>Serica</i>	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
<i>serica</i> Ill. ....	.....	.....	.....	.....	.....	.....	.....	1	.....	1

Determinations by D. B. Young, confirmed by J. J. Davis.

A scrutiny of this tabulation shows that in Albany and Rensselaer counties, *L. fusca* Froh. and *L. fraterna* Harr. were about equally abundant and far outnumbered other species so far as average grasslands are concerned, the first-named being much more numerous than the other. In Westchester county *L. hirticula* Knoch. appears to be the most abundant, *L. fusca* Froh. and *L. micans* Knoch. ranking in the order named. The swarms of May beetles at Hollis were mostly *L. fusca* Froh., though there was a goodly number of *L. hirticula* Knoch. in the collection sent, which was probably representative. A late June collection at Orient gave practically no *L. fusca* Froh., a number of *L. hirticula* Knoch., many *L. tristis* Fabr., and a number of *L. dubia* Sm., the last ranking second in the point of numbers from a presumably representative collection. The totals clearly show a large predominance of *L. fusca* Froh. with *L. hirticula* Knoch. coming next and closely followed by *L. fraterna* Harr. and *L. tristis* Fabr. This data agrees fairly closely with the estimate of these species for New Jersey, published by the late Doctor Smith in 1909. The other species mentioned in this tabulation are of minor importance.

An examination October 5th of grassland near oaks which were so badly injured last June that their owner, Mr F. B. Smith of Scho-dack, feared that he might lose his trees, disclosed an interesting condition. On digging at the base of one oak, a number of dead beetles as well as several grubs were found, while representative square feet of apparently good sodland 100 and 150 feet from trees were found to contain 10 and 13 grubs each. Portions of the field showed an excellent growth of grass, indicating a satisfactory start after mowing, while in other parts there was almost nothing green. An examination of the latter areas showed that most of the grass roots had already been destroyed. The young grubs, then only one-fourth to one-half of an inch long, were found mostly in and about the roots of the grass an inch to two inches below the surface, while an occasional specimen had worked its way down to a depth of approximately three inches. It is possible in this way to gain a very definite idea of white grub conditions, and if this be done early enough, it would frequently be possible to handle this land in such a way as to secure a good crop in spite of the pests.

Habits of beetles. They begin to appear above ground from the early part to the middle of May and remain abroad till the latter part of June, feeding upon the leaves of various trees and shrubs at night and retiring to the shelter of grass and grain fields for the day.

The flight from the fields to the trees begins just about dusk — from a little before eight till a little after eight during the latter part of June and extends over a period of only fifteen to twenty minutes as recorded by Mr J. A. West. The beetles remain in the trees during the night and at the break of day, about the time the first bird notes are heard, namely between three and four o'clock in the morning, the return to the grass fields begins and is rapidly accomplished. Experiments conducted several years ago by Professor Forbes clearly show that the beetles fly considerable distances in the search of food trees, since comparatively few beetles were captured in trap lanterns distant from trees and so protected that the lights would not attract the insects from the trees. There is little or no moving and feeding when the night temperature is below 52° F. and the minimum for normal activities is 60° F. Pairing occurs during the feeding period at night and the eggs are deposited in balls of earth about one-half of an inch in diameter and lying from one to five or six inches below the surface.

Habits of the grubs. The small, white grubs two to three months old are found until in early fall at least, as shown by our observations, among the grass roots and within two or three inches of the surface. With the approach of cold weather the grubs descend to a depth of six inches or more, remaining quiescent in oval cells during the winter and in the spring slowly make their way to the surface and feed upon the superficial grass roots. The grubs are sluggish creatures and move slowly, so that anything like a migration is impossible, though conditions in infested fields plainly indicate more or less of a movement from badly injured sod to the comparatively uninjured outlying grass. Occasionally the reverse is true and there may be somewhat of a concentration of the grubs in a central, comparatively unharmed patch. In July of the third summer they construct oval cells in the soil and change to pupae, the latter transforming to beetles in August or September and the perfect insects appearing the following May or June, thus completing the three-year life cycle.

Natural enemies. White grubs are greedily devoured by pigs which, where possible, should be given the run of badly infested fields. The common skunk, although in ill repute because of its love for chickens, searches out and destroys a great many of the grubs, frequently clearing the pests from considerable areas.

Studies in Illinois by Dr F. E. L. Beal in 1894 showed that crows ate either beetles or grubs in every month of the year from March to October, inclusive. The large size of this bird and its ground-feeding

habits makes it particularly efficient in destroying white grubs, though it also possesses some undesirable traits. Blackbirds are also known to feed upon white grubs. English sparrows were observed last summer destroying many of the beetles in and around the electric lights of Albany.

Several parasites prey upon these insects. One of the most common is known as *Tiphia inornata* Say. The oval, brown cocoons of this species are about three-fourths of an inch long and may be distinguished from those of an allied form by the slight neck or constriction at one extremity. These cocoons are frequently rather abundant in fields which have been badly infested by white grubs. Another large parasite, *Myzine sexcincta* Fabr., preys upon white grubs and spins a cocoon similar to that of *Tiphia* though differing in its greater smoothness and lacking the loose, fluffy coating of silk. *Ophion bifoveolatum* Brulle. has been reared from white grubs, and as there are a number of closely related species, some of which are quite common, it is probable that this insect and its allies are frequently very efficient checks upon the white grubs.

A large, milk-white maggot with a hard integument and black mandibles was extremely abundant at Schodack in 1912 and 1913 in fields badly infested with white grubs, and upon rearing, it proved to be a rather common robber fly known as *Promachus fitchii* O. S. The maggots live in the soil for a period of over two years and the insect evidently has a three-year cycle, which would indicate an adaptation to the habits of their prey, the white grubs. These beneficial larvae were abundant in a number of areas where white grubs had evidently destroyed most of the grass roots, though at the time of our examination very few remained alive. On the other hand, places were found near by where there were numerous white grubs and comparatively few of these beneficial maggots. This, taken in connection with the maggots actually being seen attacking the white grubs, leaves no doubt as to the beneficial habits of this comparatively unknown species. This robber fly was unusually abundant last summer at Nassau. A bee fly, *Sparnopolius fulvus* Wied., has been reared in Illinois from white grubs and has somewhat similar habits to those described above for *Promachus*. The peculiar and striking *Pyrgota undata* Wied. has also been reared from white grubs, but unfortunately both of these last-named species appear to be comparatively rare in New York State.

White grubs are also subject to fungous attack. The white grub fungous, *Cordyceps ravenelii* Berkl., occurs here and there

throughout the State. Infected grubs are easily recognized by the slender, hornlike processes arising from beneath the head and frequently attaining a length three or four times that of the host. These growths are at first green and later turn brown.

Preventives and remedies. The three-year life cycle and the marked tendency of the beetles to deposit their eggs in the more luxuriant grass, makes it comparatively easy to anticipate injuries, particularly if some attention is paid to the amount of feeding by the beetles upon forest and other trees.

The eggs are laid in June, and in September or early October the small, white grubs are readily found about grass roots and usually within three inches of the surface of the soil. These pests are then from one-fourth to one-half of an inch long and, if abundant at this time, the probabilities are that the sod, and with it, the crop will be destroyed early the next season. Land badly infested in this manner should be plowed as soon as possible, disked once or twice and, if practical, fowls or hogs allowed to run over the ground for a time to destroy many of the pests. It is unsafe to plant such land to potatoes, corn or other susceptible crops. Small grains, especially rye, buckwheat, clover and vetch are much more likely to escape serious injury, and if the plowing and seeding is early enough, it may be possible to avert entirely the injury which would normally occur the next season if nothing was done. It is fairly safe to assume that land in good cultivation the year the beetles fly, will not be badly infested with grubs the next season, even though in localities where serious outbreaks occur. It may be better to replant such land to corn or potatoes rather than to adhere to the usual and generally advisable rotation and put crops liable to injury on badly infested sodland.

The extended life cycle of these insects and their restriction to grasslands make it apparent that a systematic rotation of crops is one of the most important preventive measures that can be employed. A rotation which does not allow land to remain in sod for more than two or three years, if generally followed in a neighborhood, will result in reducing the danger of serious injury from these pests to a minimum. Such farm practice is also advisable from the general agricultural standpoint.

The danger of losing the crop when corn, potatoes or strawberries are planted upon recently turned infested sod, should be more generally recognized. The severe damage following such practice is due largely to the great reduction in the number of plants for each acre and the inevitable concentration of the grubs upon the small

amount of food available. There is nothing to show that the white grubs migrate to any great extent, more than a rod or two, through the soil. Susceptible crops, if they must be put on infested soil, should be fed liberally and cultivated thoroughly in order to assist the plants to withstand the injury. Strawberry plants set on infested land are liable to be destroyed unless the grubs are systematically dug out and killed. This, unless the infestation is very severe, is practical though somewhat costly.

FOREST TENT CATERPILLAR

Malacosoma disstria Hübn.

The season of 1914 was marked by an extension of the forest tent caterpillar ravages of recent years. Specimens or complaints were received from a number of Nassau county localities, from Delaware and Chenango counties and from areas in Saratoga, Washington, Warren, Essex, Clinton and St Lawrence counties, in particular.

These pests confine themselves on Long Island mostly to oaks, while farther north sugar maples, and in the Adirondacks poplars were largely defoliated, extensive areas in St Lawrence, Essex and Warren counties suffering severely. This is the third successive season during which these pests have been destructive in the State. The probabilities favor less injury another year, since serious outbreaks of this character are generally limited by the activity of various natural agents within three or four years. It is possible to forecast fairly accurately the relative abundance of this pest by examining the smaller twigs of favored food trees for the rather short, square-cut, light-brown egg belts. The occurrence of any number of eggs is an almost unfailing indication of serious injury next season.

Early history. This insect is a well-known forest and shade tree pest on account of its irregularly periodic outbreaks. Extensive injuries were recorded for western New York in 1857, and ten years later it was reported as having been troublesome in that section for a period of twelve years or more. A minor outbreak occurred in Washington county in 1889, and from 1897 to 1900 there were extensive defoliations in widely separated localities — the damage probably being considerably greater than in the present 1912-14 outbreak.

The pest has been active in other sections, both of the last-mentioned caterpillar outbreaks manifesting themselves in adjacent territory east and north of New York. The Central and Southern States have suffered severely in earlier years, extensive areas of oaks in Missouri, Tennessee and other states being defoliated.

Description. The caterpillar can be easily distinguished from the common apple tent caterpillar by the row of somewhat diamond-shaped, whitish spots down the middle of the back and by its feeding mostly upon oak, sugar maple and poplar, trees rarely attacked by the apple tent caterpillar.

The egg belts are also characteristic in being smaller than those of the apple tent caterpillar and with the ends terminating rather abruptly. The light brown protective covering usually has one or two transverse wrinkles or depressions.

The white or yellowish white cocoons are frequently spun in leaves on the trees or on the ground and also occur in crevices of the bark, under stones, in fence corners and in almost any convenient shelter.

The moths are light buff colored insects with a wing spread of one and one-eighth to one and one-fourth inches and with markings of darker brown. The male may be recognized by its richer coloring, smaller size and feathery antennae.

Life history and habits. The well-developed caterpillars winter within the egg and with the appearance of warm weather begin to emerge and commence feeding upon the unfolding leaves. There may be variations of a month or so in the hatching; this species is decidedly later than the more familiar apple pest. When not feeding the young caterpillars assemble in clusters on the limbs and as they increase in size, molt from time to time, leaving their cast skins in small clusters on the bark. The latter frequently give rise to the report that many of the pests have succumbed to frost or other adverse climatic conditions. Early injuries are confined mostly to the tops of the trees, and as the pests increase in size the tendency is to crawl farther down the trunks and to form larger clusters during the resting periods. A serious infestation means the stripping of the trees while the caterpillars are still partly grown and a forced migration for food. The full-grown larvae obey a natural impulse and crawl in all directions seeking for suitable shelters in which the final transformations may take place. The pupal stage lasts about two weeks, the moths appearing the latter part of June and during July, mostly in the latter month. The eggs are soon laid and remain upon the twigs unhatched until the following spring.

Food plants. Various oaks in the Southern States and on Long Island, the sugar maple and the American poplar, *Populus tremuloides*, are favorite food plants. In the Adirondacks the pin or bird cherry, elms and *Cornus* close to poplars were badly eaten or nearly stripped, while red maple and birch were almost exempt from injury unless close to defoliated trees. All the coniferae were

practically unharmed. Apple orchards are occasionally injured by the caterpillars, the larvae apparently thriving upon this tree.

In addition to these, this species has been recorded as feeding upon linden, locust, peach, plum, cherry, rose, sweet gum, dogwood, black gum, sour gum, black walnut and hickory.

Natural enemies. Some thirty-two species of native birds are known to feed upon forest tent caterpillars, the robins, orioles, vireos and nuthatchers being particularly serviceable. The encouragement and protection of native birds would seem to be one of the most economical methods of preventing periodical outbreaks by this and other destructive leaf feeders, particularly those confining their attacks largely to forest trees.

A number of predaceous and parasitic insects prey upon the caterpillars. It is probable that prior to the studies of Mr A. F. Burgess on certain Carabidae, the value of predaceous beetles as natural enemies had been greatly underestimated. His work has shown that the introduced European *Calosoma sycophanta* is a remarkably efficient enemy of the gipsy moth and there is no reason why it and its allies should not be of material service in controlling outbreaks by native species. Several Hymenopterous parasites have been reared in numbers from the cocoons of the forest tent caterpillar, though certain Dipterous parasites appear to be even more efficient natural checks.

Rearings last summer from lots of cocoons received from various localities showed a relative scarcity of natural enemies, considering the fact that this outbreak was of several years standing. For example, from one lot received from Westbury, 8 moths and only 6 parasites were obtained, another from Port Henry produced 39 moths and but 7 parasites, while a third lot from New Russia yielded 3 moths and no parasites. These figures would indicate that material reduction in the pests another season can hardly be attributed to the beneficial activity of parasites.

Remedial measures. Forest tent caterpillars are easily controlled by early and thorough applications of a poison, such as arsenate of lead, using 2 pounds to 50 gallons of water. The best results are secured if the application is made before any material injury is caused. The need of this treatment, as pointed out above, can be accurately forecasted by examining the trees any time during the winter for the purpose of determining the abundance of the egg belts. Recent advances in the development of spraying outfits have resulted in an equipment which makes it possible to spray fairly open forest lands for the very moderate sum of \$5 or \$6 an acre. These

figures obviously apply to fairly large tracts where favorable conditions obtain.

Small trees or a few trees can be protected from injury by the removal, during the winter, of the egg masses, though this method has obvious restrictions. Under certain conditions it may be advisable to offer prizes to school children for the collection of egg masses, though in the case of the forest tent caterpillar it would generally be found that the eggs are too high in the trees to permit much being accomplished in this manner. Hundreds of cocoons of this pest are spun in accessible places, and although the time during which effective work can be done is limited to approximately two weeks, it is possible to collect and destroy many of the insects in this stage with comparatively little effort. The best results will be secured if, instead of burning the cocoons, they are placed in tight receptacles covered with a wire netting having a one-fourth inch mesh. This would prevent the escape of the moths and allow the numerous parasites, usually occurring in the cocoons, to gain their freedom.

Trees adjacent to badly infested areas can be protected from the invasion of caterpillars by the application of sticky bands to the tree trunks. One of the best banding materials is tree tangle-foot. Coal tar can be used for this purpose though it should not be applied directly to the trunk but be underlaid with a thickness of stout building or roofing paper. Bands saturated with oils or greases should never be applied directly to the trunks of trees, since there is a probability of serious consequences resulting. A band of cotton about 8 or 10 inches wide, tied tightly in the middle around the tree and the upper portion turned down over the string and allowed to hang loosely, is a fairly efficient obstacle to climbing caterpillars. These bands are also of service in preventing caterpillars which fall to the ground in high winds or which may be jarred from trees, from reascending.

Bibliography. A detailed account of this insect with a limited bibliography is given in New York State Museum Memoir 8, volume 1, pages 106-15.

Oil injury. The outbreak of forest tent caterpillars for the last year or two has resulted in the adoption of various devices for the purpose of lessening the damage. In May 1913 one person applied burlap strips soaked in lubricating oil to a number of sugar maple trees set some ten or eleven years before at Dalton, Mass. These bands were for the purpose of preventing caterpillars from ascending the trees. The maples apparently leaved out normally the following spring and the first observed injury was noted in August 1914.

and was indicated by the leaves falling quite generally. An examination showed that a five-inch band of bark under the burlap had died and become loose. In some instances it was stated that 80 per cent, presumably referring to the circumference, were girdled. An attempt is to be made to offset this dangerous condition by bridge grafting.

The main point we wish to emphasize is that the application to the bark of dormant trees, especially sugar maples, of an oily substance is dangerous and very liable to be followed by disastrous results. If it is necessary to apply such bands, the trunk of the tree should be protected by an underlying layer of tarred paper or some other impervious material and the band removed as soon as it has served its purpose which, in the case of forest tent caterpillar outbreaks, would mean within four or five weeks. A safer and fully as satisfactory a material for banding purposes is the tree tanglefoot which has been so extensively employed in portions of New England infested by the gipsy moth.

BROWN-TAIL MOTH

Euproctis chrysorrhoea Linn.

Last winter a number of the hibernating webs of the brown-tail moth were found upon Fisher's island, a few upon Gardiner's island and a number on the eastern end of Long Island, especially in the vicinity of Easthampton. The distribution of this infestation strongly suggests that the moths were carried by northeast breezes from the adjacent mainland, since this insect is known to occur on the Connecticut shore near Fisher's island. The distribution is so peculiar that one can hardly attribute it to any transportation agency or the shipment of infested nursery stock.

Significance of this infestation. The invasion of Long Island by this moth means its establishment in a section where there is an abundance of oak, one of the preferred food plants upon which this noxious and pestiferous insect thrives. If this pest is allowed to multiply unchecked it will shortly spread over the entire island and many extremely desirable localities may be rendered almost uninhabitable by the abundance of the caterpillars and the severe and distressing annoyance caused by the irritating hairs of the larvae. The experience in New England is that summer resorts badly infested by this insect are avoided and in some cases almost deserted. It is unnecessary to add that such a condition would mean serious losses to many localities, not to mention the depreciation in value of many estates in which large sums of money have been invested.

Present conditions. Agents of the Department of Agriculture and the Federal Bureau of Entomology, following the discovery of the pest in New York, carefully scouted the territory last winter, removing and burning all the nests that could be found. This work was done so thoroughly that an examination October 23, 1914, of a portion of the infested area near Easthampton resulted in finding no hibernating webs containing living caterpillars. The work of last winter showed that the infestation on Long Island was confined largely to wild cherry trees, though in Massachusetts this insect displays a marked preference for the oaks. The most obvious explanation we can suggest is that the wild cherry trees, standing as they do mostly beside clear fields, have a theoretically better chance of attracting the moths, as they presumably drift indiscriminately over the land, than would be the case with the oaks which in that section occur in large clumps or cover extended areas. There may be in reality just as serious an infestation in the latter, though the presence of the pest is largely concealed by the small numbers in relation to the amount of available food.

Future treatment. It is obvious that this insect should not be allowed to multiply in this State, and for the present at least there is no better method of preventing a rapid infestation than by a systematic scouting of the infested territory and of any sections liable to be infested by this insect. Experience in the gipsy moth work in Massachusetts has shown that woodland such as that occurring on eastern Long Island can be scouted for about 25 cents an acre, provided there is no serious infestation. This is a very moderate expenditure, when we consider the benefits which should accrue from the work. The excellent results following the scouting of last winter is an indication of what may be expected if the work is continued along the original lines. The location of Long Island is such that unless there is a very large flight and spread of the moths from the mainland, the chances are very good of eliminating and preventing the infestation of the extensive oak areas. We believe that the high land values, the large investments and the comparative isolation of the island amply justify unusual efforts to protect an exceedingly beautiful and highly desirable territory.

Owing to the large areas liable to infestation, it is desirable to secure the cooperation of all interested persons in watching for the appearance of the pest, and on this account brief descriptions of the various stages are given below, together with a summary of the habits of the insect.

Description. The hibernating or winter nests are of prime importance in locating an infestation, since they are readily discovered

through the winter after the leaves have fallen. These webs are four to six inches long, occur on the tips of the smaller twigs and invariably have one or more leaves spun into the structure. In the interior of the nest there are pockets lined with soft, white silk containing a number of small, reddish brown caterpillars about one-fourth of an inch long.

The moths have a wing spread of about one and one-fourth inches and are nearly pure white, except for the conspicuous reddish brown tuft at the tip of the abdomen. The adults are found only the latter part of June or in July and may be easily recognized by these characteristics. The eggs are laid in July upon the leaves in masses of two hundred to three hundred and covered with brown hairs from the tip of the abdomen. The eggs hatch in August and the young caterpillars commence to feed and construct their shelters. The webs may be easily distinguished from those of the common apple tent caterpillar or the fall webworm, since the tent caterpillar makes its webs in the forks of the branches, whereas those of the brown-tail moth occur at the tips. The fall webworm makes much larger and more open webs than the brown-tail moth and rarely attacks pear, which is a prime favorite of this introduced species.

The caterpillars become full grown in June and then have a length of one and one-fourth inches. The head is pale brown, mottled with dark brown and the body dark brown or black with numerous fine, dull orange or gray spots over the surface. The body is sparsely covered with reddish brown, finely barbed hairs arising from warts or tubercles, and on each side there is a series of oblique, elongated, whitish markings. These, in connection with the small, bright red tubercles on the top of the tenth and eleventh segments afford the most ready means of identifying the caterpillars.

The writer has published a detailed description of the hibernating larva in New York State Museum Bulletin 103, page 16.

Life history. The partly grown caterpillars winter in the hibernating webs described above. They begin feeding with the appearance of the leaves in the spring, working downward from the tip of the branches and leaving the twigs naked with a grayish web at the top. All but the midrib is devoured except in the case of trees like the Sycamore maple, when the larger ribs also are untouched. When full grown the caterpillars disperse to some extent, which is more marked in localities where the food supply is exhausted early. Several caterpillars frequently pupate in a common cocoon, within the leaves, at the tip of the branches and sometimes in masses under fences or on the trunks and larger branches of trees. The moths fly the latter

part of June or early in July, sometimes being carried long distances by the wind. The eggs are laid usually on the under side of the leaves and the young caterpillars commence feeding in early August and cease eating preparatory to hibernation the latter part of September or in October.

ARMY WORM

Heliophila unipuncta Haw.

The army worm outbreak of last season approached in severity the extended devastations of 1896, though the area of severe damage was much more limited. The pests appeared to be most abundant upon Long Island, especially the eastern end, and also in a group of counties in the western part of the State, notably Cattaraugus, Chautauqua, Erie, Genesee, Livingston, Niagara and possibly Cayuga.

Earlier outbreaks. In view of the localized injury noted above, it is interesting to refer to the earlier history of this pest. It is stated that in 1817 many meadows and pastures in the northern towns of Rensselaer county and in the eastern portions of Saratoga county were rendered "as barren as heath." Some injury from this species was reported in the western part of the State in 1842, and in 1861 there was a serious outbreak in the vicinity of Buffalo, near the head of Seneca lake and at several other points in the southern and western counties. It was reported in 1871 from Tioga county, and four years later was quite abundant on Long Island the latter part of July and the middle of August. It again became destructive on Long Island in 1880, the caterpillars being numerous in June. This outbreak also occurred in some of the southern and eastern counties of the State.

The pest was so generally prevalent throughout the State in 1896, that the obvious concentration of severe damage to Long Island and a portion of the western part of the State was not so evident as in the case of the earlier outbreaks.

Actual losses in 1914. The presence of the army worm was reported to this office from about twenty counties, and at the time the insect appeared there was a noticeable tendency on the part of both individuals and the public press unduly to magnify the amount of injury, and on this account the Entomologist went to some pains to secure conservative estimates of the actual damage, some of which are reproduced below.

Allegany county. Mr F. C. Smith, manager of the county farm bureau, states that the army worm was very prevalent and estimates the damage in the county at \$1000. The insects were not sufficiently abundant so that there was any extended marching.

Broome county. Mr E. R. Minns, manager of the county farm bureau, states that the damage was not very serious, being confined mostly to city lawns or gardens and a few farms. A few fields of oats were cut for hay in order to save them from injury.

Cattaraugus county. Mr H. E. Crofoot, manager of the county farm bureau, records some injury to corn and serious damage to oats, the loss being about one-third on 500 to 600 acres, the average yield from uninfested fields being 27 bushels an acre.

Cayuga county. Mr C. R. Teall, manager of the county farm bureau, reports an infestation comprising about 150 acres, many of which were practically ruined, while in others the injury was small, it averaging for the infested area approximately 50 per cent.

Chautauqua county. Mr Hawley B. Rogers, manager of the county farm bureau, states that the pest was generally prevalent and estimates the damage to the oat crop at approximately 10 per cent, though in some fields it ran as high as 25 per cent.

Chemung county. Mr M. E. Cleubbuch, manager of the county farm bureau, states that the army worm did not do much damage.

Cortland county. Mr E. H. Forristall, manager of the county farm bureau, reports two local outbreaks, one resulting in the destruction of a large piece of oats and the other not causing any amount of damage.

Dutchess county. Mr F. H. Lacy, manager of the county farm bureau, reports a number of complaints of injury to oat fields, the loss ranging under 25 per cent and being confined to a relatively small proportion of the planted area. The aggregate loss in the county would run into thousands of dollars.

Erie county. Mr F. L. Strickland, horticultural inspector of the State Department of Agriculture, reports a general infestation with occasional severe injury in the northern half of the county, some twenty acres of pasture near Lancaster being destroyed in addition to injury to corn, in a few cases the entire crop being ruined.

Mr W. L. Markham, agent of the farm bureau, placed the loss at thousands of dollars and states that the injury occurred here and there over the county and in some cases acres of oats were practically destroyed.

Genesee county. Mr L. F. Strickland, horticultural inspector of the State Department of Agriculture, reported a general infestation in the northern half of Genesee county and records five acres of corn and at least forty acres of pasture as being destroyed by the pests.

Jefferson county. Mr F. E. Robertson, manager of the county farm bureau, reports three small outbreaks with a total loss of not over \$150 and a freedom from injury in the clay soil districts.

Livingston county. Prof. G. A. Bailey of the Geneseo Normal School, reports a general distribution of the pest near Mount Morris, the damage, however, appearing to be confined to a relatively small area. He estimates the severely injured area at nearly 900 acres.

Monroe county. Mr Lewis A. Toan, manager of the county farm bureau, reports injury from only five towns, there being a few fields with perhaps one or two acres of sod that were considerably damaged. He values the crop on this land at about \$5 an acre, consequently the total loss was not heavy.

Niagara county. Mr L. F. Strickland, horticultural inspector of the State Department of Agriculture, reports an infestation, especially in the southeastern corner where 60 acres of oats, 11 acres of corn, 5 acres of barley and about 10 acres of pasture were destroyed. In addition, some 20 acres of hay were injured before cutting. He estimates the severely injured area in the southern part of Niagara county at 300 acres.

A similar report was received from Mr E. H. Anderson, manager of the county farm bureau.

Ontario county. Mr D. D. Luther reported a somewhat severe though very restricted outbreak at Naples, and so far as we have been able to learn, there were no extended injuries in that county.

Oswego county. Mr E. Victor Underwood, manager of the county farm bureau, reports a limitation of the injury to two sections, namely, in the region of Mexico and in the northern part of the county in the vicinity of Sandy Creek. In the latter region the oats were cut for hay and the resultant loss was therefore not serious.

Queens county. Dr David T. Marshall of Hollis states that the pests occurred in isolated fields and lawns and, in his judgment, the damage was not great.

Suffolk county. Mr Roy Latham of Orient states that practically all timothy fields were infested, and as a result the grass was cut two to three weeks before maturity. The army worms then migrated and caused much damage to corn. There were very few parasitic flies observed on the first brood of caterpillars and, as a consequence, the second brood, appearing in July and August, were very destructive. These latter were abundantly parasitized and the third generation in late September and October appeared in Hungarian grass and caused very little damage.

Tioga and Tompkins counties. Mr V. B. Blatchley, now manager of the Tompkins County Farm Bureau, reported the pests as very

abundant on restricted areas in both counties and estimated the loss at less than \$1000.

Wyoming county. Mr H. M. Bowen, manager of the county farm bureau, reported that the army worm was not prevalent throughout the county and records injury to only one or two fields.

In addition to these, negative reports were received from Clinton, Delaware, Oneida, Onondaga, Otsego, St Lawrence and Ulster counties. The Entomologist, from personal knowledge, could add several others to the list of counties where there was very little or no injury by the army worm.

Description. The eggs are rarely seen; they are smooth, white when first laid, turning gradually to a pale straw color before hatching, and are usually deposited in masses glued together by an adhesive substance. The practical point in this connection is that the moths generally select the toughest stalks of the thickest clumps of vegetation when about to deposit eggs.

Young caterpillars. The young caterpillars, likewise rarely noticed, have a brownish black or yellowish head with dark eyes, the body being dull translucent white with minute scattering hairs. These young caterpillars are only about .07 of an inch long and walk in a looping manner.

Full-grown caterpillars. The full-grown or nearly full-grown caterpillars, the stage usually attracting attention, present quite a range of color though the general appearance is fairly characteristic. The larger caterpillars are about one and one-half inches long. They may be recognized by the median white line beginning at the head and extending a variable distance along the back; in some of the lighter and younger ones it may be traced the length of the body. Either side of the median white line there is a brown, broad stripe more or less distinct, which may be mottled with white in the lighter individuals; this stripe is bordered laterally by a narrower one of dark brown. Next there is a white line similar to the median one but more constant, and between it and the next white line there is a stripe of variable brown sometimes mottled with white; this is usually lighter than the stripe on either side of the median white line; the stigmatal stripe comes next and this, in well-marked individuals, is the most striking, it being as dark as any, and below it there is the white substigmatal stripe; these last two are somewhat variable. The ventral surface is a variable yellowish green. The prolegs or abdominal legs are brown at the base.

Pupa. The mahogany brown pupa is about three-fourths of an inch long, rather stout, and at the posterior extremity there is a pair

of slightly converging spines and on each side of these, two fine, curled hooks; the spiracles are nearly black. The pupae are found just beneath the surface of the soil.

Moth. The moth is a plain appearing, reddish gray or fawn-colored insect with a wing spread of about one and one-half inches. The forewing is peculiar because of the small, characteristic, angular, white spot near the middle. These characteristics will serve for the recognition of the adult.

Life history and habits. There were two destructive broods in 1896, and the same conditions appear to prevail the present season, since moths were reported by Roy Latham at Orient as late as November 28th. This record was accompanied by the statement that a few pupae were being turned out by the plow. Doctor Howard considers there may be as many as six generations annually in the Southern States.

The accepted life history in this State may be briefly summarized as follows: Overwintered moths or recently emerged ones, which may hibernate as larvae or possibly pupae, deposit eggs early in the spring and from them the first brood of larvae develop. These latter, on account of their comparatively small numbers, rarely prove destructive and are consequently unnoticed. They complete their growth, pupate, and the moths emerge and lay the eggs from which is produced the second and usually destructive brood of caterpillars or army worms. These become nearly full grown early in July, and at about this time the reports of serious injuries are generally received. This second generation of caterpillars pupates the later half of July and the moths emerge early in August. They in turn, deposit eggs the latter part of the month and early in September the third brood makes its appearance, and by the latter part of the month is full grown. This generation occasionally becomes quite injurious, as was the case at Ghent, N. Y., in 1896, the larvae pupating the last of September or early in October and moths emerging the last of October and into November and probably wintering as adults.

The habits of the moths are of considerable importance in practical control work, since outbreaks are most likely to occur where adults are numerous and deposit eggs freely. The moths fly in the early evening hours or during the day in cloudy weather and are probably capable of long, sustained flights. There is a suspicion that injuries in the north by this insect may be due to extended flights of the adults, a theory which is supported in part at least, by the long flights of the allied cotton moth, *Alabama argillacea* Hübn. The army worm moths feed upon a variety of blossoms and also upon fruit,

such as red berries of the Tartarian honeysuckle. The eggs are ordinarily deposited in thick tufts of grass, the oldest and toughest stalks being selected and the eggs thrust down between the sheath and the stalk and usually secured by a gummy secretion. There is an evident preference on the part of the insect for cut straw in old stacks and hayricks, etc. in the early part of the season. The frequent occurrence of army worm outbreaks near rather low areas, especially in the vicinity of thick growths of coarse plants, is undoubtedly due to the moths searching out such conditions for the deposition of eggs.

Habits of the caterpillars. The young caterpillars hatch from the eggs in eight to ten days and remain in hiding most of the time, feeding only during cloudy weather and at night. At first they eat only the lower surface of the leaf and in about a week begin to gnaw holes in the sides of the leaves. As growth continues there is a marked increase in the feeding, and if the pests are at all numerous, nearby provender is soon exhausted and the caterpillars are then forced to move or march in the search of additional forage. This extension of the feeding area may be scarcely noticeable or moderate if the pests are not too abundant, or in the case of severe outbreaks, especially if these occur in connection with the local scarcity of food, may result in extended injuries, such as the destruction of acres of grain, corn or even grass. The detection of an outbreak in one locality is significant only as it indicates the probability of local conditions being favorable for the abundance of the insect. There is no danger of the caterpillars marching any great distance, five hundred to a thousand feet would probably represent the maximum, and this would be reached only under exceptional conditions.

Natural enemies. Army worms are subject to attack by a number of natural enemies, especially the maggots of a grayish fly somewhat resembling, though considerably larger than, the ordinary house fly. The most important is known as the red-tailed *Tachina* fly, *Winthemia quadripustulata* Fabr., a species which sometimes occurs in swarms in badly infested fields and the one frequently responsible for the almost total annihilation of a destructive generation. It is rare, if the second brood of army worms be abundant, to have serious injury by the third generation, although the normal prolificacy of the insect, if unchecked, would mean much more extended damage. This beneficial fly and its allies deposit oval, white eggs about one-twelfth of an inch long on the body of the caterpillar, usually just behind the head, and wherever egg-bearing army worms are numerous the chances of the succeeding brood causing little damage are excellent.

In addition to the parasitic flies mentioned above, there are a number of four-winged parasites which render material aid in checking this species. Predaceous beetles, especially the common ground beetles and their voracious larvae, are sometimes abundant and destroy many of the pests.

Native insectivorous birds are also valuable allies in controlling this pest. The chipping sparrow, English field sparrow, song sparrow, robin, flicker, bluebird, blackbird, kingbird, cowbird, catbird, pheasant, yellow-legs and upland plover, being recorded ¹ as feeding upon army worms; the robin being considered one of the most efficient. Mr A. C. Weeks of Brooklyn cites in the local press ² one case in which birds quickly cleared an infested field. Poultry and toads are also credited with devouring many of the caterpillars.

A deadly bacterial infection sometimes destroys large numbers of the pests. Unfortunately the effectiveness of this disease appears to be very dependent upon favorable climatic conditions and is therefore of limited value.

Adverse climatic conditions have an important influence and it has been held that a dry season followed by a wet one is likely to be an army worm year, though probabilities based upon any such data must of necessity ignore the extremely valuable services rendered by natural enemies. It is very likely that large numbers of the insects succumb to the rigors of our winter climate, otherwise the first brood of the caterpillars would probably be more injurious than later generations, owing to the smaller amount of forage available in the spring.

Control measures. Clean culture, which in this instance means the elimination of walls, brush and stone piles with their usual margin of coarse, rank vegetation, is an important step in discouraging oviposition by the moths and thus preventing an outbreak.

Little can be done to save a field generally infested with army worms, aside from cutting and harvesting the crop at once in order to prevent further injury.

It is important to meet an outbreak at its inception. In early July it is not a difficult task to find the caterpillars some days before they are usually seen. The thickest portion of a field should be examined for their small, black or brown droppings and injury to the lower leaves of the grass or grain. If these signs of injury are present, the army worms may be found hidden under loose shelter of any kind on the ground or just below the surface. Knowing the conditions it is then comparatively easy to decide whether or not to cut

¹ 1914 Fernald, H. T. Mass. State Board of Agric., Cir. 22, p. 11.

² 1914 Brooklyn Daily Eagle, Aug. 6, p. 3.

the crop at once. Such precautions are particularly advisable in sections liable to attack and in many localities where army worms are known to be prevalent.

Barriers. Crops adjacent to a badly infested field may be protected from invasion by the use of various barriers, such as a ditch or a deep furrow with its perpendicular side toward the field to be protected. If the army worms are abundant, holes about two feet in depth should be made in the bottom of the furrow at a distance of fifteen to twenty feet. The caterpillars falling into the ditch crawl along it and soon collect in these depressions where they can be readily crushed or destroyed by applications of oil or other deleterious materials. Ditches or furrows should be watched to keep the sides next the crop to be protected smooth and perpendicular and the depression from being bridged over by the accumulated bodies of the caterpillars.

Broad bands of tar, where conditions permit, may also be used as a barrier, or the tar may be applied to boards set up on edge. Tree tanglefoot could be used in the same way.

Barrier strips of poisoned vegetation are sometimes employed. A strip a rod or so in width is sprayed with a heavy dose of poison, preferably Paris green used at the rate of at least 1 pound to 50 gallons of water. The poisoned portion of the crop should be carefully destroyed in order to prevent its being eaten later by domestic animals.

Poisoned bait, especially for limited infestations in the vicinity of dwellings, has been used very successfully. The Kansas bait, the formula for which is given on page 47, may be used for this purpose. This bait may be spread rather thickly across the line of march or sown broadcast in a badly infested field. The distribution should be rather sparse; otherwise there will be great danger of poisoning birds.

Bibliography. A detailed account, with an extended bibliography, is given by Lintner in the twelfth report on the Injurious and Other Insects of the State of New York, 1896, pages 190 to 214.

EUROPEAN PINE—SHOOT MOTH

Evetria buoliana Schiff.

The establishment of this European insect in several New York localities means the addition to our fauna of another serious pine enemy. It is considered in Europe as one of the most destructive insects to young pines, owing to its attacking the buds of the terminal cluster, especially the leader, and the consequent deformation of the

tree. The most characteristic type of injury is the peculiar bend, owing to the borers feeding mostly upon one side of a shoot and resulting in a bayonet or posthorn deformity termed by the French and Germans, respectively, as "baionette" and "posthörner." The appearance of a badly infested shoot with four or five buds killed, is shown on plate 3, figure 3.

History of the American introduction. This insect, discovered early in the season, was undoubtedly imported with European pines and, judging from the condition of certain infested trees on Long Island, has been in this country three or four years. It is known to occur in New York State at Great Neck, Westbury, near Mineola and at Yonkers, while a recently issued circular of the Federal Bureau of Entomology records it in addition, from Massachusetts, Rhode Island, Connecticut, New Jersey and Pennsylvania. This wide dissemination was undoubtedly brought about by the shipment of infested trees, since the condition of the trees attacked indicates a probable local habit for the adults.

Food plants. This borer has been recorded as infesting all kinds of European pines and as equally injurious to American pines grown in Europe.

General characteristics of attack. The destruction of terminal buds produces a marked deformation which can not be confused with the work of the white pine weevil, *Pissodes strobi* Peck, or with that of our native pine twig borers, such as *Evetria frustana* Scudd., or *Pinipestis zimmermani* Grote. The first attacks the bare twigs almost exclusively, while our native pine twig moth borers confine their attacks to individual shoots, frequently producing a dead tip here and there two to three inches long. This recently introduced European pest habitually attacks several adjacent buds, destroying or deforming them while in an incipient stage (Plate 3, figure 3). Here and there one may find a peculiar bayonet-shaped deformation, though on badly infested trees dead, partly developed buds are much more numerous. Trees in the latter condition may be well headed back, stunted and with almost every terminal showing several small, dead shoots. As many as six buds may be destroyed in one whorl. The early stages of infestation are indicated only by the rather obscure exudation of pitch, frequently rather granular, at the base of the buds, and on examination a brown, black-headed borer may be found within.

Life history and habits. There is but one generation annually in Europe, though fears have been expressed that the different climatic conditions of America may result in the production of two broods.

On the continent the moths fly in June and July and deposit their eggs singly the latter part of July or in August on the terminal bud whorls. The caterpillars hatch late in the summer and gnaw the side of the bud, causing a flow of pitch which covers the borer and forms a hibernating shelter, according to Gillanders, though our own examinations show overwintering larvae within the bud or an adjacent portion of a twig. With the appearance of warm weather, namely in April and May, the borers resume activities, attack adjacent buds and then kill or injure most of the shoots or buds of a cluster. The more advanced shoots are usually injured so that they lop or bend down, and as growth continues there is a turn upward and the characteristic bayonet or posthorn deformity results. Smaller or younger shoots may be tunneled and destroyed. The borers confine themselves to the more tender, soft growth and cease feeding the latter part of May or early in June, and pupate in the hollow shoots. The duration of this latter stage is variously given as from ten to about twenty-one days. The appearance of the moth is preceded by the pupa pushing itself partly out of the burrow. The moths issue in this state mostly during June.

Description. *Moth.* Wing spread 18 to 22 mm. Antennae brownish. Head and thorax pale yellow. Eyes black. Abdomen dark gray. Forewings yellowish red, the red heightened by very variable silvery cross-lines. The hind wings are a uniform dark gray with pale gray fringes.

Larva. Length 21 mm. Head, thoracic shield and true legs black, the body dark brown.

Pupa. Length 1.5 mm, yellowish brown, the dorsum of the abdominal segments with conspicuous, transverse rows of chitinous tubercles.

Distribution. This species has been recorded by Meyrick from western central Europe and northern Asia.

Control measures. The boring habits of the caterpillar preclude the use of ordinary insecticides and, judging from the apparently local habits of the moths, it should be comparatively easy to control this pest in nurseries and on small trees at least by cutting out and burning all infested shoots during the fall and winter. It should be possible, in many localities, practically to exterminate the species by thorough work as indicated above, and where this is attempted it is advisable to supplement the winter pruning by examining the trees again in May or early June for the purpose of removing any infested tips which may have escaped previous observation.

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Various sources of information have been drawn upon freely in preparing the above account, a few of the more important references being given below.

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BOX LEAF MIDGE

Monarthropalpus buxi Lab.

The European leaf miner of the box has evidently become well established in this country. It was first brought to our notice as an American insect by the reception in May 1910 of infested leaves from Prof. A. E. Stene, who collected them at Newport, R. I. Subsequent investigations have shown this insect to be thoroughly established on Long Island. The box on one large estate at Roslyn was generally infested and many of the plants were in a somewhat weakened and very unsightly condition as a result of its attacks. Reference to European literature shows this insect to be a common and in some localities, a destructive pest. Professor Chaine even attributing the death of box plants in the public garden of Bordeaux to the work of this insect.

Signs of infestation. The presence of this pest is indicated by more or less irregular, oval swellings on the leaves (Plate 2, figure 1), each marking an eccentric, oval, clear space mined beneath by one or more pale yellowish-white maggots about one-sixteenth of an inch long. There may be a very slight elevation on the leaf with an irregular, yellowish or brownish discoloration, the margin of the enlargement being indicated by darker green. This condition is most easily noted in September and later after the maggots are more than half grown. An infested leaf may contain only one or two of the miners and show comparatively little injury, or there may be six or more of the pests with an accompanying destruction of the larger part of the leaf. This attack, as intimated above, weakens the plant and results in the badly infested leaves dropping in the spring, leaving unsightly, bare stems with new leaves developing at the tip.

Description. The gall produced by this insect has been described above. The midge is a slender, fragile, yellowish fly about one-twelfth of an inch long and remarkable because of the long legs and antennae. Technical descriptions of both sexes and the larvae are given below.

Male. Length 2 mm. Antennae nearly as long as the body, sparsely haired, reddish; 14 segments, the fifth having the basal portion of the stem with a length twice its diameter, the distal part with a length three times its diameter. The enlargements bear whorls of rather stout, curved setae, the basal one and the distal two circumfili, the loops of the latter, being short, stout and approaching those of *Hormomyia*; terminal segment with the basal enlargement subglobose, the basal portion of the stem short, irregular, the distal enlargement with a length one-half greater than its diameter, somewhat rounded and bearing apically a broadly pyriform, subsessile appendage. The palpus consists of one large segment somewhat expanded distally and sparsely setose. Mesonotum, scutellum and postscutellum a variable yellowish orange, the submedian lines sparsely haired. Abdomen sparsely haired, a variable orange, the basal segments lighter, the distal bright orange. Genitalia fuscous yellowish. Wings hyaline, costa dark brown, the third vein uniting with the margin at the apex of the wing. Halteres orange basally, fuscous yellowish distally. Legs a nearly uniform yellowish orange, the claws tapering, simple, the pulvilli rudimentary. Genitalia; basal clasp segment stout; terminal clasp segment short, stout, the dorsal plate broadly and triangularly emarginate, the lobes broadly rounded, the ventral plate long, broadly and roundly emarginate, the lobes tapering.

Female. Length 2.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, reddish; 14 segments, the fifth with a stem one-half the length of the cylindric basal enlargement, which latter has a length three times its diameter and rather high circumfili at the basal third and apically; terminal segment with a length twice its diameter, irregularly obtuse. Body a nearly uniform reddish orange, and the abdomen sparsely haired. Ovipositor short, broadly rounded and with a curved, chitinous spine having a length about one-half that of the abdomen. Other characters about as in the male.

Exuviae. Length 2.5 mm, pale yellowish orange, cephalic horns short, broadly triangular, the thoracic horns slender, slightly curved. Wing covers extending to the third abdominal segment, the leg cases to the fourth. The surface of the abdominal segments finely granulated; posterior extremity with a pair of submedian, broadly triangular, chitinous processes.

Larva, hibernating. Length 1.75 mm. slender, yellowish green, the head broadly rounded anteriorly, the antennae biarticulate, stout, the distal segment with a length nearly three times its diameter; breastbone bidentate, the anterior portion dark brown, the shaft semitransparent, obsolescent. Segmentation distinct, the skin

coarsely shagreened; posterior extremity broadly rounded and with a pair of submedian processes, the latter irregularly subconical and indistinctly segmented.

Life history. Material obtained from Rhode Island in 1910 produced numerous midges the latter part of May, which is probably about the time that the flies might be expected to issue in Long Island localities. The observations of Professor Chaîne, extending over a period of three years at Bordeaux, France, showed that the earliest pupae were observed from the 1st to the 25th of March, the earliest adults appearing from the 24th of March to the 16th of April. His investigations demonstrated that the period of oviposition lasts two to three weeks, the female normally selecting the younger leaves and depositing the eggs singly at a distance from each other and in a small slit cut by the bladelike ovipositor. Doctor Laboulbène, after studying this insect in Paris, states that the adults appear from early to the middle of May. Professor Chaîne obtained no evidence of the midges feeding, though he observed that they were strong flyers, since they were found two hundred meters from the nearest box and at a height equal to the first story of a house.

The first indications of attack, according to Professor Chaîne, are very small, rounded points on the under side of the leaves, indicated only by a slight change in color. There is a slight increase in the size of the discolored areas during the first week of June, and the second week a small, yellowish spot may be visible upon the upper surface of the leaf, and on the under side there is a relatively great development due to the young maggots enlarging their mines. These latter increase in size and a week or two later may extend to the edge of the leaf and become confluent. As a result, infested leaves in September and October show one or more large mines inhabited by two to three or more larvae. Frequently most of the tissues on one or both sides of the leaf may be attacked by these maggots, though as a rule the mines on opposite sides of the midrib do not coalesce. Winter is passed in these shelters, the larvae transforming to pupae and the latter partly issuing through a circular hole prior to the appearance of the parent fly the latter part of May or early in June. There appears to be but one generation annually.

Natural enemies. A number of gall midges, at least, are subject to attack by natural enemies, though as yet we have been unable to obtain any parasites from this species. There is a record of M. Decaux having reared one Chalcid, species undetermined. The mere fact that there are records of severe injuries in Europe by

this midge would suggest a probability, at least, that ordinarily it was not particularly destructive, and if this be the case, natural enemies, especially parasites, are probably the controlling agency. If such exist they should be obtained and colonized in this country so as to provide for a more or less perfect natural control.

Remedial measures. The investigations of Professor Chaine lead him to advise the dusting of the under side of the leaves with flowers of sulphur, making the application at about the time the midges commence to fly and, if necessary, repeating it once or twice in order to secure complete protection. He advises a preliminary wetting of the foliage and then the dusting from the under side. He is of the opinion that even road dust is nearly as effective, and was led to adopt this method after observing the comparative immunity of box plants growing near dusty highways. More or less difficulty would be experienced in keeping the leaves sufficiently dusted to produce the desired results, and in the case of an ornamental plant this is to be avoided if possible.

Two or three sprayings of a contact insecticide such as kerosene emulsion or a whale oil soap solution applied when the midges are beginning to issue and distributed during the period of flight, appeared to be very effective in controlling this midge, according to statements from Mr Butterson of Newport, R. I., received through the kindness of Prof. A. E. Stene of Kingston.

A series of laboratory experiments were conducted by the Entomologist last fall for the purpose of ascertaining the possibility of destroying these miners while still within the leaves. Carbon bisulphid, ammonia gas, hydrocyanic acid gas and vapors from flake naphthalene were the materials employed. There was no difficulty in killing the larvae with the first two named, and the maggots showed the effects of treatment with the latter two. The great difficulty with ammonia was that it seriously injured the foliage as well as destroyed the maggots. These laboratory experiments indicate a probability, at least, that fumigation with ordinary commercial carbon bisulphid, using one teaspoonful for each five quarts of space and continuing the action at least one hour and probably two or three hours, would result in the death of most of the maggots with little or no material injury to the box plants. It would be necessary only to provide some suitable form of an air-tight, flexible box or tent which could be put over section after section of the infested hedge. The insecticide should be placed in shallow pans or saucers. The larger the area of the liquid, the quicker evaporation and more effective the treatment, other things being equal. We are

inclined to believe that fumigation with this material could be done to the best advantage in early July and thus destroy the young maggots before there was any material injury to the foliage. The experiments referred to above were conducted in October and consequently after much of the injury had been caused. There is a bare possibility that the physiological resistance of the small larvae is greater than that of those half grown, a matter which should be carefully tested another season.

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 1914 **Felt, E. P.** Econom. Ent., Jour. 8: 94-95

GRASSHOPPERS

New York State suffered last summer from an almost unprecedented grasshopper outbreak. The pests were confined largely to the sandy areas bordering the Adirondacks and extending from Poland, Herkimer county, through Fulton and Saratoga counties north to Warren and Clinton counties, though isolated outbreaks occurred on limited areas in other sections of the State.

Reports of the unusual abundance of grasshoppers and accompanying injuries came in early June. Press bulletins giving directions for the control of the pests were prepared and sent to newspapers in the infested region. This was supplemented by personal observations in and about Gloversville July 10th, and a week later, at the request of the Governor, the Entomologist went to the infested region and, in cooperation with agents of the State Department of Agriculture and others, proceeded to push an aggressive campaign against the pests. It was ascertained at the outset that while the grasshoppers moved freely from field to field and invaded the more attractive grain, yet in a wider sense the insects were local. The extended flights recorded of western species did not occur and a study of the situation convinced us that individual effort would, as a rule,

be nullified to only a very slight extent by migration. Throughout the region there was a general feeling that it would be comparatively useless for the individual to take up what seemed to be a very uneven conflict.

With these conditions in mind, a large scale demonstration was started July 18th. A badly infested oat field of about 22 acres was selected for the test. The Kansas bait, consisting of 20 pounds of bran, 1 pound of Paris green, 2 quarts of cheap syrup, 3 lemons and $3\frac{1}{2}$ gallons of water was used. The bran and Paris green were thoroughly mixed while dry, the juice of the lemons was squeezed into the water and the remaining pulp and peel cut fine by running it through an ordinary meat grinder. The poisoned bran was well dampened or mixed with this liquid, producing a moist though not sloppy preparation. This was distributed over the field, beginning about 10.30 o'clock in the morning, much as grain is sown, a good handful making three or four throws and covering approximately 200 square feet. It was the intention to use about 4 pounds of bran to the acre, but as a matter of fact it was approximately 6, owing to the difficulty of securing a uniform distribution. The poisoned bait was so thinly spread in the field that one had to look closely in order to find it. Observations showed that many grasshoppers began to feed upon the bait within three or five minutes after it fell to the ground and, in some instances, they seemed to drop from the oats, being attracted by the smell, and gradually made their way to small particles of the bait. About four hours after the first application, namely, 2.30 o'clock in the afternoon, a few sick grasshoppers were noticed here and there. At 6.30 o'clock the next afternoon, less than 36 hours after the beginning of the treatment, three-fourths of the grasshoppers in this field were dead or dying, twelve to fourteen dead insects being easily found on a square foot and frequently six or seven were collected in a small crevice as many inches long. There was a noticeable tendency to collect in hollows or at the base of the grain stalks. Practically the same conditions obtained the next morning. Three days after the application it was estimated that about four-fifths of the grasshoppers were dead, sixty-seven being found in one square foot, an average square yard contained twenty-six dead grasshoppers and another sixty-four. Five days after the bait was distributed, sick grasshoppers were still to be seen, though there had been a heavy two-hour rain the day before and the efficiency of the bait was probably decreased. The next day it was estimated that over nine-tenths of the grasshoppers originally in the field had been destroyed by the bait and many of the few remaining were de-

cidedly weak and would probably succumb within a day or two. Ten days after the demonstration was started, fully 99 per cent of the pests were dead. There was a very marked contrast between conditions obtaining at this time and those noted at the beginning of the demonstration. The cost of the materials was estimated at 13 cents an acre.

The work in this demonstration area was checked by observations in other fields, particularly in one or two representative areas, and it was most gratifying to note that in fields where the distribution was thorough, the results were as good or nearly as good as those outlined above. The oat field of Mr E. W. Peck, located a mile west of Mecos, is particularly noteworthy. This was surrounded by large areas of grass which had been badly infested. The hay had just been cut and the grasshoppers, at the time of our examination on July 17th, were drifting into the oats in large numbers. The grain was luxuriant and stout and the seeding had made an excellent growth. On July 21st poison bait was sown in this field and the next day there was a heavy rain for two hours. An examination on the 23d, forty-eight hours after the distribution of the bait, resulted in finding a number of dead grasshoppers, and the next day three to nine dead insects could easily be found in twelve inches of a grain row. There was very little injury by insects either to the oats or the luxuriant seeding.

Practically as good results were obtained by a number of other farmers who used the bait according to directions. A very thin distribution, so scattering that it was difficult to find particles of the mixture, seemed to give better results than where more of the bait was used, and there was certainly much less danger of poisoning birds or other larger animals. The grasshoppers, as was shown by repeated observations, experienced no difficulty in locating pieces of bait the size of a grain of wheat or even smaller.

Injuries. Serious injuries the preceding year were reported by a number of individuals here and there in the Gloversville section, and an examination of representative areas last summer showed that the pests fairly swarmed in some places and had inflicted grave losses. There were certainly two hundred acres of oats, buckwheat, corn, rye and other grain in the vicinity of Gloversville which were either injured or liable to be seriously injured by the grasshoppers, and conditions obtaining here were representative of many other sections where the pests were numerous. The grasshoppers tend to collect in shelters of one kind or another and in a number of instances practically defoliated berry bushes. They invaded cornfields, establishing

themselves at the base of the leaves and fouling the fodder with their excrement. They even ate half through corn stalks an inch or so in diameter. There were a few cases observed where hunger compelled the insects to gnaw most of the bark from currant bushes.

The greatest damage was in the grain fields. Practically all the leaves were eaten from the rye and the insects attacked the heads, gnawing away one-fourth to two-thirds of the grain (Plate 2, figure 2), and reducing the yield to almost nothing. Oat fields, acres in extent, were invaded, the leaves stripped from the stalks and much grain lost by the insects feeding upon the heads and causing a shelling of from one-fourth to over half the crop. Occasionally almost nothing of value would be left in the field.

The injury to buckwheat was even more striking, most of the fields being surrounded by a strip of one to three or even ten rods upon which nothing green was permitted to grow. This was due to the young grasshoppers invading the field and devouring every vestige of the small plants so that the buckwheat was practically killed out. The pests seemed unwilling or unable to leave the shelter of the tall grass or hedge rows and live in the comparatively exposed buckwheat field, though occasionally large areas of buckwheat were entirely destroyed. The injury to this grain was apparently caused mostly by the young grasshoppers, though full-grown individuals were found in small numbers throughout the fields. A few typical cases of injury to grass and grain are given below.

Mr E. W. Peck has a large grass and grain farm a mile west of Meco, on sandy soil. The grass crop was reduced from one-half to two-thirds and possibly more, while in certain restricted areas almost nothing was obtained from fields which should have produced a fairly good crop.

A. Lasher & Son have a 400 acre farm near Union Mills, some 33 acres being in oats, 17 in corn and 15 in buckwheat. Mr Lasher stated that the yield of certain hay fields was greatly reduced; in one instance he obtained only two loads where he should have secured twelve. Many other instances of similar injury could be adduced.

Mr Frank Priester, a truck gardener of Saratoga, estimated the damage from grasshoppers on 17 acres amounted to \$1000, most of which could have been averted by the judicious employment of a poisoned bait. Market gardens near Saratoga were very seriously affected, cauliflower and cabbage being destroyed, while asparagus stems and branches were peeled in part by the insects.

Mr George A. Saportus, also of Saratoga, had 30 acres of oats, one-half of which was destroyed by grasshoppers.

Limitation of the outbreak. This matter is of great practical importance in control work, since if there is a general flight and distribution of the pests, individual effort is of comparatively little value. It was noted at the very beginning of our investigations that the trouble was confined entirely, or nearly so, to sandy areas and the further our inquiries were pushed, the more data supporting this conclusion were obtained. A most striking instance of this limitation was to be seen along the State road from Gloversville to Broadalbin in the vicinity of the Skinner Creek valley. To the southeast of this road is a fertile, well-cultivated valley which last summer was practically free from grasshoppers, while on the northwest and extending almost to the road, was a series of low, sandy hills and generally sparse vegetation which fairly swarmed in places with grasshoppers. The line of demarcation was so sharp that hosts of grasshoppers could be found in some places within 200 feet of the roadway on one side, while practically none were to be seen upon the other. The same conditions, but on a much larger scale, obtained in the Mohawk valley. There were no signs of an unusual number of grasshoppers in the valley from Amsterdam west as far as St Johnsville, and in the latter locality inquiry from a number of presumably well-informed persons failed to disclose any knowledge of nearby infestations, though in the sandy region of Lassellsville, about 3 miles to the north of St Johnsville, millions of the pests were to be found. The same restriction, broadly speaking, was noted in Saratoga, Warren and Dutchess counties, and so far as we were able to learn, obtained in other sections where the pests were extremely abundant. In other words, there is a close connection between the sandy soil and sparse vegetation and an outbreak of local grasshoppers such as that which caused so much loss last summer.

Species destructive. The lesser red-legged grasshopper, *Melanoplus atlantis* Riley, was by far the most destructive species, and the evidence at hand, including earlier records, leads us to support the conclusion of Scudder¹ that this is probably the form which has been responsible for most of the earlier grasshopper injury in the eastern part of the United States. This pest is very similar to the more generally distributed and commoner red-legged grasshopper, *Melanoplus femur-rubrum* De G., the two forms differing in somewhat obscure structural characters and, to a marked extent, in prolificacy. *M. atlantis*, according to Scudder, has a very wide distribution, extending from the Atlantic to the Pacific and ranging north as far as latitude 50°, and on the Pacific coast extending to

¹ U. S. Nat. Mus. Proc. 20: 182, 1897.

the Yukon river. It is not found in the southernmost Atlantic states and most of California.

This pest winters in egg pods characteristic of many grasshoppers and normally hatches about the middle or latter part of May and, as shown by our observations of last summer, is particularly abundant in comparatively open, sandy regions where there is a relatively sparse vegetation. Wild or partly cultivated light soils appear to be particularly favored by this insect. According to the observations of Professor Somes in Minnesota, it is very likely to become abundant with a series of favorable seasons. The grasshoppers become mature from June 20 to the middle of July and from then till frost may be seen pairing. About the middle of August the deposition of eggs begins. A female deposits during the latter part of her existence, two to three and possibly four egg pods, a total of possibly one hundred eggs. Dry and rather firm soil is preferred for oviposition. Frequently large numbers of eggs are deposited within a very limited area, and upon their hatching in the spring the ground may be fairly discolored with the hosts of recently hatched grasshoppers. The young grasshoppers feed for a time in the immediate vicinity of their hatching places and very frequently, as shown by the conditions of the buckwheat fields, shelter in the fence rows and work into the young buckwheat to such an extent as totally to destroy the crop on the margins. Somewhat the same conditions obtain in mowings or pastures around spots where there is a heavy deposition of eggs. The feeding is sometimes so extensive as nearly to kill the grass. There is no evidence for supporting the belief that there is more than one generation in the north, though according to observations by Riley at St Louis, Mo., the first matured insects appeared July 12th, deposited eggs by the 20th and young hatching therefrom developed in 80 days. Bruner has also observed a second brood in the District of Columbia, the adults being smaller and darker.

The red-legged grasshopper, *Melanoplus femur-rubrum* DeG., is one of the commonest and most generally distributed of our species and is not readily separated from the lesser red-legged grasshopper, *Melanoplus atlantis* Riley. According to Bruner, it is a frequenter of low grounds, cultivated fields, shaded margins of woods, etc., where vegetation is rank and tender. It is rarely found upon dry hillsides or low adjacent meadows that fairly swarm with insects, a condition quite reverse of that which obtains with the lesser red-legged grasshopper. Collecting the past season resulted in practically none being found in association with the destructive species of the Adirondack foothills, though it was commonly present.

and in some instances abundant, in lower lying and better cultivated areas. According to Scudder, it appears to inhabit the entire United States and the settled parts of Canada, excepting only Alaska, and occurs south of our border as far as central Mexico. There are records, open to question, of this insect having been taken in Arctic America, Great Bear lake and Labrador.

The life history of this insect is practically the same as that of the lesser red-legged grasshopper and presumably, owing in considerable measure to its preference for low lands, unfavorable climatic conditions, enemies and parasites serve as fairly effective checks, and very rarely do we find the serious local injury recorded of the preceding species. Lugger states that it is favored by dry summers. This is probably due to the much greater relative freedom from fungous infection, a disease fatal to many grasshoppers.

These two closely related red-legged forms may be separated on general characters from each other, according to Prof. F. L. Washburn, as follows:

The general color is tan or yellowish brown and the larger part of the hind legs is marked by two distinct bars on the outer face, while the tip of the abdomen in the males always has a distinct notch. Lesser red-legged grasshopper.

The general color is reddish brown and there are no distinct dark bars on the hind legs. This species is usually smaller and shorter winged than the preceding. Red-legged grasshopper.

The two-striped grasshopper, *Melanoplus femoratus* Burm., is a large, yellowish brown form, easily distinguished when at rest by the rather distinct yellowish subdorsal lines. The young and newly transformed adults are greenish and the hind legs may be as red as those of the typical red-legged grasshopper. This species was associated in considerable numbers, perhaps 20 per cent of the whole, with the lesser red-legged grasshopper, *Melanoplus atlantis* Riley. Alone it would have been of comparatively little economic importance though it is a voracious feeder. The transformations of this insect are somewhat later than those of the lesser red-legged grasshopper, since nymphs were rather commonly present up to about the 20th of July. It is interesting to note that in Minnesota Professor Somes classes this as perhaps the most serious grasshopper pest in the state and adds that with a series of favorable years it becomes very abundant and causes great loss, especially where cereals are largely grown. The earliest oviposition noted by him was August 8th, and he cites one instance of having secured three egg masses from one female, the number of eggs in a pod varying from 39 to 82. In St Louis,

Riley records the first adults as occurring July 7th, eggs being deposited August 31st. Lugger states that this species prefers bottom lands and the edges of cultivated fields and other places with rank vegetation, and adds that although adults occur as early as the 10th of July, no eggs are deposited until late in August. This species succumbs to poisoned baits as quickly as *M. atlanis*. It is widely distributed throughout the State, as shown by the following records.

Pellucid grasshopper (*Camnula pellucida* Scudd.) This light brown, somewhat variable grasshopper was found in large numbers associated with *Melanoplus atlanis* Riley at Wells, August 3d, though collecting at Gloversville in July resulted in the capture of but one specimen. This species matures in Minnesota, according to Somes, the latter part of June and oviposits the last of August, the egg pods being rather short, stout, considerably curved and not firmly cemented. The eggs are placed just below the surface of the soil, among the roots of grasses or, in some cases, even above the surface in the dead grass. Individual pods contain from 20 to 30 eggs. This species has been recorded by Lugger as causing considerable damage in association with *M. atlanis*, and it is one of the forms held responsible for extended depredations in earlier years in California. It is considered to be partly migratory in habit and evidently disappears earlier in the season than *M. atlanis*. Like its associate in this State, it displays a marked preference for relatively wild areas and appears to be favored by dry seasons.

The Carolina grasshopper, *Dissosteira carolina* Linn., was associated in some numbers with *Melanoplus atlanis* and *M. femoratus* in the grasshopper outbreak of last summer, though it was rarely abundant enough to attract notice, except in the more open, sandy areas or along roadsides. This species is particularly likely to attract notice because of its large size and peculiar coloration. It is primarily an inhabitant of waste, sandy areas and the coloration is such that the insect, when at rest, harmonizes very closely with its surroundings, although when in flight the dark brown, yellow margined hind wings make it a conspicuous object. The males have a peculiar habit of rising into the air a few feet and vibrating the wings rapidly with a strange whirring or clacking sound; when engaged in this evolution, they resemble the hovering of the morning-cloak butterfly, *Euvanesa antiopa* Linn. The transformations of this insect are later than those of *Melanoplus atlanis* or *M. femoratus*, since adults were present in only very small numbers near Gloversville July 17th, while the stocky, grayish nymphs were numerous at that time. The latter part of July most of the young

had transformed to adults. This species, like its allies, winters in egg pods deposited in the earth, and it is probable that several pods are deposited by each female. The species is widely distributed throughout the State and rarely abundant enough so that it can be considered of much economic importance.

Control measures. Our studies of the grasshopper problem, at least so far as New York State is concerned, show an intimate relation between waste lands or a low type of agriculture land and serious depredations by these insects. The reasons for this in part, at least, is that the relatively scanty vegetation found in such places is unfavorable for the development of fungous diseases and consequently the pests escape a heavy death rate which would normally occur where the vegetation was more abundant. Second, the scarcity of food results in its rapid disappearance and the insects therefore become apparently more numerous than would be the case on good sodland, and if the grasshoppers be very numerous they are impelled by hunger to move from their scanty pasturage to other feeding grounds. Another important point worthy of recognition in this State is that, broadly speaking, the grasshoppers are local and drift or fly to only a comparatively limited extent. This has a practical bearing in that it means local efforts will not be nullified to any material extent by migration from adjacent fields. It is hardly to be expected that grasshopper invasions will result in the clearing up of some wild land poorly adapted to agricultural practices, though the recognition of the connection existing between the two will enable the farmer, wherever he be located, to estimate more correctly the probability of serious injury from these pests. A dry season, especially in May and early June, when the destructive grasshoppers are small, means that an unusually large proportion will attain maturity and cause more or less injury for the remainder of the summer, the effect being cumulative if these conditions prevail for several years in succession.

Destruction of eggs. Plowing to a depth of about eight inches is fatal to the egg masses and, where feasible, this is an excellent precautionary measure, though under most conditions obtaining in New York State, as we know them, we fear that this measure can scarcely be recommended for general adoption.

Destruction of young grasshoppers. Young grasshoppers, as pointed out above, frequently hatch in large numbers from limited areas and, of necessity, devour all the vegetation in and about their hatching grounds. The hatching of the lesser red-legged grasshopper occurs the latter part of May. The firm, sparsely grassed

sod of roadsides and along fences is a favorite place. Enormous numbers of the insects can be destroyed in such places with a blazing spray of oil, such as was extensively used in earlier years in the work against the gipsy moth. An ordinary hand-spraying outfit may be employed, using a nozzle extension, preferably iron, at least eight feet long and spraying crude petroleum. The oil is lighted after the apparatus is started and we have in this equipment a powerful and very efficient blast torch.

The experiments of Prof. F. L. Washburn, state entomologist of Minnesota, have shown that young hoppers can be destroyed by spraying the adjacent vegetation with the following compound: Sodium arsenite 3 pounds, water 180 gallons, molasses $1\frac{1}{2}$ gallons; or in reduced proportions, sodium arsenite 1 pound, water 60 gallons and molasses 2 quarts. The sodium arsenite should be dissolved in the water, the molasses added and the whole then thoroughly stirred. This costs only 30 cents an acre and may be applied with any fairly efficient spraying outfit. The dilution of the poison is such that it is not dangerous to either plants or stock if used as directed, though precautions should always be taken to prevent cattle from feeding freely in sprayed fields immediately after the treatment. This spray should be applied to a strip two to four rods wide around the area where the young grasshoppers are abundant or, if the infestation is not too extensive, to the entire field. In some instances where straw is convenient, it may be spread lightly over areas badly infested with young grasshoppers and then burned in the evening after the insects have taken shelter beneath it.

Hopperdozers, which are simply mechanical devices for collecting grasshoppers, have been extensively employed in some western states and are particularly successful in destroying the partly grown insects. The essential of a hopperdozer is a rather broad, shallow pan containing water with a little kerosene floating on its surface. This device is provided with screens or shields on the side and back in order to prevent many of the insects from hopping or flying over the machine while in operation and some arrangement is made for drawing it through the field. It may be pulled by hand or drawn by horses and can be used to best advantage only where the infested fields are moderately smooth. The sheet iron or heavy tin pans should be about four inches deep, some two feet wide and from four to fourteen or eighteen feet long, and in the case of the larger ones, water-tight compartments should be inserted every two feet or so, otherwise the water and kerosene will accumulate at one end or spill and the effectiveness of the device be greatly lessened. There should

be at the back a light canvas or oilcloth shield two to three feet high and held in place by braces. Runners are provided at each end, and in the case of the larger hopperdozers, several in between, the height of these varying from two to eight or ten inches according to the crop to be protected and the age of the insects to be captured. The oil quickly kills the pests and the collected grasshoppers should be removed as soon as the pans are well filled and more kerosene and water added, if necessary. The hopperdozer is particularly valuable in places where it is inadvisable to use poisoned baits.

Poisoned baits. This is one of the most effective and cheapest methods of destroying grasshoppers, especially after they have become nearly full grown. One great advantage of the poisoned bait is that under ordinary conditions it may remain effective for a week or ten days, killing insects most of the time and occasionally destroying others, because hungry grasshoppers have not hesitated to devour the remains of their dead associates. The very effective poisoned bait, mentioned above, is composed of 20 pounds of bran, 1 pound of Paris green, 2 quarts of cheap syrup, 3 oranges or lemons and $3\frac{1}{2}$ gallons of water. The bran and Paris green are thoroughly mixed while dry and if large quantities are to be used, it is important that the men preparing this protect the nostrils with a moistened sponge and avoid breathing the poisoned dust so far as practical. The juice of the lemons or oranges should be squeezed into the water and the remaining pulp and peel chopped fine and put in the water and the syrup added. The poisoned bran is then well dampened or mixed with this liquid. The addition of the lemons or oranges appears to increase materially the attractiveness of the bait. The mixture as prepared is moist and sufficiently mealy so that it can be sown broadcast in a field. The quantities given above are sufficient for five acres. It should be distributed preferably early in the morning and sown in as small particles as possible in order to secure the greatest efficiency and at the same time lessen the danger of poisoning birds and other animals.

The Criddle mixture is composed of Paris green 1 part, salt 2 parts, and horse droppings (preferably fresh) 35 to 40 parts by measure. It should be thoroughly mixed with enough water to make a soft though not sloppy paste and then distributed throughout the infested field. This was tried in some portions of the grasshopper-infested region and reported nearly as effective as the poisoned bait given above.

These poisoned baits are relatively cheap, the first named costing for materials and application only about 30 cents an acre. It is

perhaps needless to state that they should be applied in the early part of the outbreak, and if the work is well done results should begin to be apparent within twenty-four hours, and from then onward a gradual dying of the pests may be expected for a week or even ten days. Fowls and other domestic animals should not be allowed in fields where poisoned baits are distributed, for at least ten days or two weeks, though the probabilities at any time are against the larger animals getting sufficient poison to produce serious results, provided ordinary precautions are observed in the distribution of the bait. We would advise, if this material is used in cornfields, sowing it in such a way that very little or none will drop onto the leaves and perhaps lodge at the base of the leaf sheathes; otherwise there is a possibility of poisoning animals with the fodder later. Too much care can not be exercised in looking after all the containers used for the bait, since the grain and sweetening are very attractive to animals.

NOTES FOR THE YEAR

The following observations relate to some of the more injurious or interesting species coming to notice during the year and are grouped as heretofore, under appropriate subheads.

FRUIT INSECTS

Apple tent caterpillar (*Malacosoma americana* Fabr.). There was a general and, in many localities, a serious infestation by this common, conspicuous and easily controlled pest. The plague extended from Long Island north to Clinton and St Lawrence counties and west to Chautauqua county. There was less injury in some localities than during the previous year, though wild cherry trees were frequently stripped and many apple orchards not given the best of care were severely injured or defoliated. The caterpillars were hardly seen in well-sprayed orchards.

This common insect winters, as is well known, in dark-brown egg belts deposited on the smaller twigs of wild cherry and apple, in particular. The caterpillars are fully formed in the fall and remain in the eggs over winter, issuing with the first warm weather and attacking the unfolding leaves. The gregarious habits of the pests and their conspicuous nests render their early detection easy.

It is entirely practical to forecast the abundance of this leaf feeder by looking for the egg masses during the winter. Collecting and burning of these may be advisable in the case of small trees, though the caterpillars, either small or nearly full grown, succumb quickly to such a poison as arsenate of lead used at the rate of 2 pounds to 50 gallons of water. Good spraying should give results in twenty-four to forty-eight hours, unless the caterpillars are so nearly full grown that they will stop feeding rather than eat the poisoned foliage. Wild cherry is a preferred food plant and a prolific source of trouble for adjacent apple orchards. This comparatively worthless tree should be kept cut down so far as practical and thus reduce, in large measure, the probability of a recurrence of such outbreaks as that of last year. This species is so easily detected and so readily controlled that there is no good reason why it should be allowed to become excessively numerous, except possibly in those sections seriously handicapped by extremely low land values.

Burning the nest with a torch is comparatively inefficient, since many of the pests are likely to escape and there is danger of severely injuring the limbs. It is simpler and more satisfactory to remove

the nests with a small, conical brush on the end of a light pole, or an ordinary bamboo pole with the tip slightly roughened can be used almost equally well. All that is necessary is to bring the end of the pole in contact with the lower portion of the nest and then with a twisting and elevating movement roll the nest and its contents around the end of the pole. This, if carefully done, will result in removing practically all the caterpillars with the nest. The latter should of course be crushed or otherwise disposed of so as to destroy the inhabitants.

Ten-lined inch worm (*Erannis tiliaria* Harr.). An outbreak by this rather common caterpillar was reported from Olivera, Ulster county, by Mr R. F. Pearsall, who stated that the pest was very destructive to both orchard and woodland trees. It was associated with the spring canker worm in defoliating maple and elm trees near the village of Greenwich, according to a report transmitted by Principal C. L. Morey. This occasionally injurious form nearly defoliated an orchard at Munnsville, Madison county, in 1899.

The caterpillar is easily recognized by its orange head and yellowish body, the latter marked dorsally with a series of ten fine, somewhat broken, wavy, black lines. It becomes full grown about the middle of June and has a length of one and one-fourth inches. The pests then desert the trees and transform to pupae in earthen cells some five or six inches below the surface, the moths issuing late in October or early in November. The female is wingless and has a yellowish body sprinkled with black dots, while the male has a wing spread of nearly two inches, the forewings being a rusty buff sprinkled with brown spots and with two wavy, brown lines, the inner one often indistinct. There was a considerable flight of this moth in Albany October 21st, in association with the cotton moth, *Alabama argillacea* Hübn., and it is probable that this insect was equally, if not more, abundant at Kingston, since specimens were received from Dr J. R. Gillett of that city. The caterpillar of this species, like the allied much more common and destructive canker worms, can be easily destroyed by early and thorough spraying with a poison, such as arsenate of lead, using 4 pounds or even more to 50 gallons of water.

Green fruit worm (*Xylina antennata* Walk.). Adults of this species were received the latter part of March and early in April from Mr E. B. Jansen, Kingston, and the indications are that we narrowly escaped an outbreak by this insect upon soft maples comparable with that of 1898, or the more extended defoliations of 1911. Caterpillars of this species are also known as green

fruit worms and occasionally cause serious injury in orchards by gnawing holes in the small fruit. Observations in apple orchards at both Poughkeepsie and Bangall the latter part of May showed these pests to be unusually abundant, and in an orchard at Kinderhook small pear trees only three years old were rather commonly infested with four or five caterpillars. The pests were so numerous in this latter case as to cause an appreciable amount of injury to the foliage.

Observations of Professor Herrick in 1913 showed that these moths fly in very early spring and deposit their whitish or flesh-colored, ribbed, flattish globose eggs singly in scars, especially leaf scars on the branches. The larval habit of eating into the young fruit makes it difficult to control this species satisfactorily by ordinary spraying, though as a rule the pests are not very destructive in well-sprayed orchards.

Pear thrips (*Euthrips pyri* Dan.). This new and minute insect pest has been very injurious locally here and there in the Hudson valley. On May 12th we examined a pear orchard at Clarksville of some 1000 trees which, we were informed, bore a full crop last year and showed nothing in the way of blossom blight. The Seckle and Bartlett pears were badly injured, one-half to three-fourths or even more of the blossoms being blighted. The Kieffers were practically free from the trouble and were just breaking into bloom. A most remarkable condition was observed the latter part of May in a small pear orchard at Bangall. The trees, mostly Seckles, were very badly infested and the damage was so pronounced in the case of a number as to result not only in the blasting of the blossoms, but the destruction of the young leaves so that the upper half of the trees was practically bare, while the lower branches were in fairly good foliage. The crop of Seckle pears in this orchard was practically ruined and there was a serious reduction in the yield of the Bartletts. A larger pear grower near Hudson reported an estimated loss of 300 barrels of Seckle pears. Mr William Albright of New Baltimore considered that the pest had been unusually injurious, owing to the cold, backward weather holding the buds in check and giving the thrips an extended opportunity for work. The injury was confined mostly to the Seckles and he noted a marked restriction of the infestation to trees standing in low places or under a hill. He also observed an abundance of thrips on certain apple trees, having counted as many as 19 in one blossom. A pronounced limitation to certain localities or portions of orchards continues to be a feature of attacks by this pest, and in the case of the Clarksville orchard it would appear as though there may have been a some-

what marked invasion by flight or drifting with the wind, otherwise the serious injury of one season could hardly be preceded by almost complete immunity the previous year.

The most evident signs of the insect's presence are the sticky buds, the brown, blasted appearance of the blossom buds and the unusual drop of bud scales followed later by small, crinkled, spoon-shaped leaves. In the earlier stages of the attack a slender, dark brown insect only one-twentieth of an inch long may be seen upon the opening fruit buds and especially in crevices between the stems of the partly expanded fruit clusters.

Badly infested orchards should have the lime-sulphur spray for San José scale delayed until the buds have started and then add to this preparation a tobacco extract, such as black leaf 40, 1 to 800. This will destroy many of the thrips before they have had an opportunity to find shelters in the buds which have opened just sufficiently so that the insects can make their way down between the stems of the young fruit. Later, if the thrips are numerous, it is advisable to spray with a tobacco extract, at the above given strength, to which have been added 4 to 6 pounds of soap, just as soon as the young pears have separated sufficiently so that the insects at the base of the fruit stems are exposed. This spray, in particular, should be directed so that the insecticide will be driven down into all crevices of the fruit clusters. Another treatment with the tobacco extract and soap may be advisable after the blossoms fall. This insect works so rapidly and seeks shelter so persistently that timeliness is a prime essential in control work.

Pear midge (*Contarinia pyrivora* Riley). Although this insect became established in this country about 1877 and its dissemination has been recorded in more or less detail, records of serious injury are comparatively few. It has been known in southern Albany county for a number of years. It appears to thrive on the heavy lime soils of that section, and last spring, according to the statement of Mr Robert McHench of Clarksville, was responsible for the destruction of probably 90 barrels of pears, the pear thrips blasting an equal amount of an estimated crop of 200 barrels. Under ordinary conditions the pear midge would not have been particularly injurious, the destroyed fruit representing a rather severe and somewhat desirable thinning. It is interesting to note in this connection that this insect (and the same is true of the pear thrips) appears to be unknown on the light soil of the extensive pear-growing region of Kinderhook and vicinity. A summary account of the pear midge is given in the report for 1912, N. Y. State Museum Bulletin 165, pages 97 to 99.

Pear psylla (*Psylla pyricola* Forst.). This pest has caused an unusual amount of damage in some Hudson valley orchards this year and certain growers seem to have overlooked the fact that it is nearly as important to take care of hibernating shelters near trees, as to destroy the insects which may be wintering upon the trees. Stone walls, piles of brush, hedge rows along fences, all afford satisfactory hibernating quarters for the hibernating psyllas or "flies," and the proximity of such shelters almost invariably means serious injury to orchards.

Repeated tests with delayed applications of the lime-sulphur wash used at winter strength have given very satisfactory results in the control of this insect. Similar treatment with a miscible oil appears to be equally or perhaps a little more effective. The important point in such work is to delay the application until the psyllas have deposited most of their eggs. This time coincides very closely with the breaking open of the blossom buds; the spraying should be done just before this occurs.

Practical tests last season with a midsummer spray of black leaf 40, using three-fourths of a pint to 100 gallons of water and 4 to 8 pounds of soap showed that it was possible to check severely, if not entirely to destroy the insect. Wherever some eggs and adults escape such treatment, a second spraying should be given within a week or ten days.

Banded grape bug (*Paracalocoris scrupeus* Say). Observations upon this species, noticed in some detail in the report for last year¹, were continued the past season by Mr L. F. Strickland, horticultural inspector of the State Department of Agriculture, and through his cooperation we secured material from which detailed descriptions of the immature stages were prepared. The following observations upon the habits of this species were kindly placed at our disposal by Mr Strickland.

The first bug was observed May 21st, the second May 25th, and hatching was evidently completed by the 27th. According to observations by Mr Strickland, the first molt occurred from May 27th to 30th, the second from May 28th to June 4th, the third from May 30th to June 8th, the fourth from June 4th to June 10th, and the fifth from June 6th to June 17th, adults being found from these two latter dates until June 28th, the last bugs being seen on rosebushes on the last named date. He also observed this species repeatedly on apple foliage.

¹N. Y. State Mus. Bul. 175, p. 41-44, 1913, 1915.

Field observations by Mr Strickland show that the first and second stage nymphs have the same color characteristics except that in the first stage the color is a light greenish yellow and the banding of the legs and antennae less conspicuous. The third and fourth stages are colored nearly the same, the bodies being red with a light streak down the back, while in the fifth or last nymphal stage the insects are green, changing to brown with a light streak down the back, the antennae and legs being banded in each case.

Below are given more detailed descriptions, those of the younger stages being drafted from alcoholic material, while the later stages were described from living material.

First stage. Nymph 1.5 mm, a pale greenish yellow, the eyes, red, the antennae fuscous yellowish, rather indistinctly banded; the basal half of the second and third, and the distal fifth of the third antennal segments whitish, the fourth pale yellowish; legs pale yellowish; tibiae with a narrow basal band, a moderately broad band near the basal third and the distal third white; basal half of the tarsi white.

Second stage. Length 2 mm, coloration nearly as in the preceding stage, except that it is mostly a greenish and the darker bands of the second and third antennal segments are yellowish red or reddish, and the banding of the legs yellowish brown or brownish.

Third stage. Length 2 to 2.75 mm, antennae mostly a rich dark brown, except for the white banding and the terminal segment which are as given above. Eyes reddish; body a variable reddish with a rather distinct median whitish line, the apical portion of the abdomen yellowish. Legs mostly dark brown, the anterior and mid tibiae with the basal third reddish brown and divided by a narrow, white line, the distal two-thirds mostly whitish, each third marked apically with an obscure yellowish or reddish brown band; tarsi fuscous yellowish with an obscure whitish band near the middle; posterior tibiae with a distinct broad, white band near the basal third and the entire distal third whitish, the tarsi yellowish basally, fuscous yellowish apically and with a broad, white band in the middle.

Fourth stage. Length 3 to 3.5 mm, much as in the second stage, except that the body is somewhat greener and the wing pads slightly fuscous just at molting. The specimens show a distinct, irregular, median, light greenish area extending from the base of the head to and including the base of the abdomen. The dorsum of the head and lateral portions of the thorax reddish purple, the abdomen mostly mottled with deep red, each segment posteriorly with a row of six irregular, whitish spots. Color of antennae and legs practically as in the preceding stage.

Fifth stage. Length 4 mm. This differs from the preceding in the dorsum of the head, the lateral portions of the thorax and the wing covers being a dark brown, the median area whitish green. The dorsum of the abdomen is somewhat darker, with the transverse rows of irregular, circular spots more distinct and pale green. Coloration of the antennae and legs practically as in the preceding stage.

Observations by Mr Strickland on May 27th showed a general infestation, counts of groups of check vines resulting in finding 22, 6 and 27 bugs on 7, 6 and 8 vines, respectively. The young bugs were then working in the tips of the shoots, the latter being about 6 inches long. The vines were sprayed with black leaf 40, three-fourths of a pint to 100 gallons of water, to which were added 5 pounds of laundry soap and 6 pounds of arsenate of lead. The application was made to two rows of 99 vines, the infestation of the checks being given above. The following day 12 bugs were found on 7 vines in one of the rows, 11 bugs on 6 vines in the second row, and 9 bugs on 8 vines in another vineyard, which had been sprayed with this formula, the original infestation being 55 and 32 bugs to 21 vines. The spraying resulted in the destruction of over 58 per cent of the pests. There was a general migration of the young bugs from the tips at about the time the cluster sheaths had broken on June 1st, and another spraying was given at this time with the above-designated materials, with the result that no bugs were found on a continuous series of 6 vines in one row, and only 5 on a similar series in another, the infestation in the latter case being confined to two vines.

Tabulation of results of spraying for cluster infestation

ROW	2	3	5
Vine 1.....	0	0	0
2.....	0	0	0
3.....	0	0	1
4.....	0	0	0

The vines, it will be seen from the table given above, were practically free from the pests after this last spraying. On June 17th many of the berries were observed dropping from the clusters, which were uneven as in the preceding year. Mr Strickland finally concluded that this dropping of the immature grapes may have been

caused by a weak pollination rather than as a result of insect injury. There is, nevertheless, a probability of some injury resulting from the presence of these insects. The biological data given above are of value in indicating what may be possible with allied species on other fruits, even if this form is not a serious enemy of the grape, and the facts are therefore placed on record.

Spotted winged Idiocerus (*Idiocerus maculipennis* Fitch). The recently hatched nymphs are small, shining, brownish black and only about one twenty-fifth of an inch long. They were active and abundant on apple trees at Arlington May 14th, though they did not seem to be causing any particular injury. About ten days later the nymphs were still abundant in the field, though in the second stage. At this time the orchard was being sprayed for the control of the red bug and it was noted that these nymphs appeared to be much less susceptible to the insecticide. By June 25th the nymphs had attained the adult condition, and by July 8th they were rather common in the orchard and numerous nymphal skins were seen here and there on the leaves. There was no injury which could be definitely associated with the species. Both nymphs and adults are active and not readily captured.

Messrs Osborn and Ball¹ state that this species occurs very commonly on hawthorn and crabapple trees, the larvae appearing in May. The earlier ones mature by the middle of June and later individuals early in July. The adults were reported by them as common the latter half of June and nearly through July, and as again common the last of August and early in September. This latter would suggest the possibility of a second brood. These authors have figured both the adult and nymph of this species.

San José scale. The appearance during the summer and fall of 1913 of hosts of small, four-winged parasites aroused a lively interest among fruit growers and led many to hope that at last we had a thoroughly effective natural check for the San José scale. Investigations and observations of last year showed these beneficial species, notably *Prospaltella perniciosi* Tower and *Aphelinus fuscipennis* How., to be widely and generally distributed and the more important species in this beneficial work, though *Coccophagus immaculatus* How. and several associated forms were obtained in smaller numbers.

Observations upon the San José scale and its parasites have been continued during the past season and early in July a circular letter

¹ Davenport Academy Natural Sciences Proceedings, 8: 73, pl. 3, fig. 4, 1898.

was sent to several hundred representative fruit growers in different sections of the State, requesting their cooperation in securing data relative to the prolificacy of the San José scale and the evidences of parasitic control, attention being particularly directed to the condition of unsprayed orchards and the relative abundance of the pest as compared with earlier years. Reports from residents of the Hudson valley, especially that portion south of Albany and north of Newburg, resulted in our learning of a number of unsprayed orchards which had not been seriously injured by San José scale. A few similar reports, though relatively by no means so many, were received from the western part of the State. The reason for this discrepancy is probably due to the fact that in these larger orchard areas it was easier to prevent San José scale becoming well established and, as a consequence, general conditions were not so favorable for the establishment of the parasites. There are probably several factors involved in the comparative immunity from this pest. The scale does not thrive so well on trees in a relatively poor condition, as they usually are in unsprayed orchards. Nevertheless, observations in the towns of Schodack and Stuyvesant and in the vicinity of Poughkeepsie resulted in our finding orchards where the parasites had evidently been numerous and important factors in checking the pest in 1913 and were continuing their beneficial work to some extent, at least, the past season. Dr Harvey Losee of Upper Red Hook reported under date of July 22d, to the effect that the scale had been diminishing for the past three years to such an extent that it could now be scarcely found on unsprayed trees. He referred to some young Ben Davis trees, a variety particularly subject to attack, and stated that five years ago they were badly infested while at the present time they are as clean and thrifty as well-sprayed trees. It is possible that some other factor besides parasitic activity has been important in checking the pest in this particular case.

It is yet early to estimate the true value of these small parasites, since in order to be effective they must be numerous for a series of years and demonstrate their capability, in orchards in first-class condition, of keeping the San José scale within reasonable bounds. Spraying with a lime-sulphur wash has become so habitual with most progressive fruit growers, and the benefits from this operation have been so manifest, that there is little likelihood of there being a suspension in this practice for the purpose of giving the natural enemies a chance, and until this is done it will be nearly impossible to approximate the full value of these tiny allies. The incidental benefits resulting from the lime-sulphur application are, in our esti-

mation, more than sufficient to cover the cost of the treatment and for the present, at least, we would advocate a continuance of the spraying without regard to parasites. These insects, if they are destined to have an important effect upon their hosts, will gradually become more abundant in the smaller, unsprayed orchards, and here we may expect them to render the most effective service, since it is relatively more costly and difficult for the owner of a few trees to spray.

GRASS AND GARDEN INSECTS

Grass webworms (*Crambus luteolellus* Clem.). Last June several complaints of severe injury accompanied by specimens were received from F. H. Lacy, agent of the Dutchess county farm bureau. The larvae were identified as the above-named species, and upon examination it was found that they had practically destroyed 25 per cent of the crop in a two-acre field, the damage being most evident on the lighter knolls. There was also serious injury reported from Pine Plains.

Grass webworms live by preference upon grasses and ordinarily their depredations in cultivated fields are limited to portions adjacent to mowings or pastures. The parent moths fly but a short distance as a rule, generally alighting within a rod or two. The eggs are dropped indiscriminately on the ground, the young caterpillars feed for a time, winter about the roots of grasses in a half-grown condition and then complete their development the following June. Occasionally as many as thirty caterpillars may be found in one hill of corn, mostly at the base of the stalks, and under such conditions a crop is out of the question. The full-grown larvae are dull whitish or purplish with a darker head and attain a length of about three-fourths of an inch.

This species may be distinguished from associated forms by the darker markings of its yellowish head, the approximate submedian tubercles of the abdominal segments with their inner margins truncate and the peculiar projection of the suprastigmatal tubercle obliquely below and behind the spiracle. A detailed description is given below.

Larva. Length 1.5 cm. Head a yellowish amber, mottled with brown, the thoracic shield fuscous yellowish and the body a light grayish yellow with slightly darker tubercles.

The mottling of the head is irregular and varies from light to dark brown, there being a tendency toward the formation of irregular, rectangular spots. Laterally the head is ornamented with rather

long, stout, sparse setae. The antennae are biarticulate and short, the segments being broader than long. The labrum is reddish brown, the thoracic shield has a median, paler line and the second and third thoracic segments dorsally have a pair of submedian, bisetose, oval tubercles on the anterior annulus, and a transverse median tubercle on the posterior annulus, that on the third segment being partly divided. The abdominal segments have submedian, subquadrate tubercles, the anterior ones as wide as the annulus and unisetose, the posterior ones narrower, longer and with the seta near the lateral fourth, both tubercles being almost truncate mesially. Above the suprastigmatal line there are two irregular tubercles, the one on the anterior annulus unisetose, irregularly ovoid and with an almost divided extension obliquely below and behind the spiracle; that on the posterior irregularly fusiform and with the long axis slightly oblique to the vertical axis of the body; the ninth abdominal segment with a median, compound, narrowly ovoid, polysetose tubercle; the suranal plate covering most of the tenth segment and with a number of irregularly placed setae; true legs pale yellowish transparent; prolegs whitish, the rows of minute claws dark brown.¹

There is no very practical method of fighting these pests, owing to the fact that usually severe injury is caused before their presence is suspected and then it is too late to do much to protect the remainder of the crop. In localities where these pests are likely to be abundant it is advisable to keep corn and other crops liable to attack, at some distance from grasslands and to avoid planting upon recently turned sod. Plowing land infested by these insects in late summer or early fall, say August or early September, should result in most of the caterpillars perishing before the following spring. If this be impractical, spring plowing should be delayed as late as possible so as to give the caterpillars a chance to complete, so far as practical, feeding before the sod is turned under. The planting of an extra amount of seed would assist to some extent. There is a better chance of the crop outgrowing the injury if it be upon well-manured, highly cultivated land.

Yellow field ant (*Solenopsis debilis* Mayr?) The latter part of June a complaint was received from Ernest W. Conklin of Salt Point, through F. H. Lacy, agent of the Dutchess county farm bureau, to the effect that recently planted corn seemed to be growing smaller and was troubled with an ant eating the heart out of the

¹ Insects of Illinois, 23d Rep't, p. 154, 1905. Professor Forbes gives here a key for the separation of webworm larvae likely to be found injuring corn.

kernels. An examination July 16th showed that a small yellow ant, presumably the above-named species, had excavated the interior of kernels of corn here and there, scattering the granular remains about in the soil and leaving the outer shell or coat of the kernel nearly intact. This type of injury was much less prevalent than damage by grass webworms described elsewhere, and as a rule it is not serious and is rarely reported. The only published records of this character are those by Doctor Forbes, state entomologist of Illinois. The development of the corn is arrested and, as noted above, the plants may even seem to grow smaller.

In localities where this field ant is numerous and liable to cause damage in the above-described manner, we would suggest tarring the corn and adding thereto a poison such as Paris green or arsenate of lead. In experiments recently conducted in Massachusetts, gas tar was diluted with linseed oil until rather thin and the seed tarred and then coated with road dust and Paris green mixed in such a proportion that the corn after being shaken up in a bucket showed a greenish color. This protective coating will probably prevent the ants attacking the seed until growth is so well started that comparatively little harm would result. Corn treated in this manner can be sown with a planter.

Say's blister beetle (*Pomphopoea sayi* Lec.). The soft blister beetles have a somewhat characteristic shape and are usually dull colored. This, the largest of our native forms, is nearly an inch long and is easily distinguished from its allies by its rather stout, olive green body and the shining black, orange-banded legs. It was unusually abundant and injurious in the vicinity of Albany the latter part of May and early in June, having been reported from such widely separated localities as Port Jervis, Feura Bush, Rensselaer, Canajoharie and Little Falls. The records of 1909 indicate that these beetles may be found the latter part of June and early in July. The Rensselaer outbreak was marked by the appearance of hosts of the insects in an acre of beans, the crop being threatened with destruction by their feeding upon the blossoms. The species had been comparatively rare until recent years. It was brought to our attention first in 1900, and in 1909 and 1911 there were numerous rather local outbreaks. The beetles occur in swarms and display a marked preference for locust blossoms. The outbreak lasts only about a week and, as a rule, the results are not serious. The beetles have also been recorded as feeding upon peach blossoms, wheat and the leaves of butternut. The grubs feed upon grasshopper eggs and the probabilities are that the species is decidedly beneficial on the whole, even though

occasional local depredations are committed. It is possible that the insects could be driven from valued fruit trees by the use of long switches, jarring or even the employment, when weather conditions are favorable, of a dense smoke. It is better to attempt some such method than to destroy the beetles by hand picking or the use of poisons. The latter can not be used with safety upon trees in bloom, to say nothing of its being against the law.

Juniper plant bug (*Chlorochroa uhleri* Stal.). This large, olive green stink bug with pinkish markings is easily recognized and usually rare, though in June 1894 it was reported from Brockport as having nearly destroyed a crop of peaches. Several years ago the writer was surprised to find some eight or ten of these striking bugs on a small pine tree at North Chatham, and the past summer reports of the unprecedented abundance of this insect, accompanied by serious injury, were received from Miss M. A. Soule, Quaker Street, Schenectady county. Miss Soule states that the bugs were so thick that the sunflower seeds were practically destroyed (hundreds being on one head). They injured green corn and blasted small peas while still within the pods, the insects evidently piercing the pods and drawing the sap direct from the seeds, thus preventing a normal development. Tomatoes were also injured and turned black at the point of attack within a few days, fully half the crop being affected. Quantities of currants and black berries were likewise spoiled. Others in that section were similarly troubled, it was stated.

Miss Soule kindly forwarded a number of living bugs and we were able to verify her reports so far as corn and tomatoes were concerned. The insects repeatedly established themselves upon the surface of a tomato, and after a time the slender, chitinous lancets were forced into the fruit to their full extent, the ensheathing labium folding back near its middle as the head is pushed down, until the lower margin touched the surface of the fruit. One bug remained over a feeding puncture twenty-seven minutes, repeatedly raising and lowering its head as it partly withdrew or forced the lancets into the fruit. When the latter occurred, the lancets were supported only by the tip of the labium and the tissues which they pierced. The next day the fruit would show an oval, slightly sunken area about one-fourth of an inch in diameter, the center being marked by a minute puncture. This injured spot became more visible the second day, and later exhibited some discoloration. A similar injury was also observed to kernels of sweet corn in the milk.

The Juniper plant bug was by far the most abundant species concerned in this injury, though a related form, *Euschistus*

variolarius Pal. Beauv., was present in much smaller numbers and was observed feeding upon both corn and tomatoes. This insect apparently experienced less difficulty in piercing the skin of the tomato, though it did not drive the lancets so deep into the fruit as to necessitate the folding of the labium.

Such outbreaks are very unusual and can ordinarily be controlled best by systematic hand picking, such as jarring the bugs into a shallow pan containing water and kerosene.

Iris borer (*Macronoctua onusta* Grote). Specimens of this borer were received under date of August 12th last, from Mrs C. H. Van Orden of Catskill, accompanied by the statement that the pests were working havoc in an Iris bed and making a clean sweep of the plants. A detailed account of this insect was published by the writer in the 27th report of this office, Museum Bulletin 155, pages 52 to 54, and since this notice appeared the investigations of Mr A. F. Winn,¹ Westmount, Quebec, have shown that the greenish eggs of this species are deposited in the fall. The moth was observed to lay her eggs in the long crack of one leaf and also between the edges of overlapping leaves where they probably remain unhatched until spring. Mr Winn describes the egg as pale greenish, turning in a few days to purplish. It is much flattened on the top and bottom and shaped somewhat like a vest button. The transverse diameter is .6 mm and the vertical diameter .27 mm. It is marked with shallow ribs which are most evident on the rounded sides. Winter burning of the debris on Iris beds, if this can be done without injury to the roots, is the simplest and most effective method of keeping this pest in check since, as shown by these observations, it must result in the destruction of the hibernating eggs.

ORNAMENTAL AND SHADE TREE PESTS

European hornet (*Vespa crabro* Linn.). The white-faced hornet of America, *Vespa maculata* Linn., is well known because of its large size, bright contrasting markings and the very large, nearly globular, paper nests rather commonly seen hanging from the eaves of buildings or the branches of trees. The European representative (Plate 2, figure 3) of this hornet is even larger, has become well established in southern New York and throughout New Jersey, and during the last few years has attracted notice because of its gnawing off the bark from the small branches of various trees, especially birch (Plate 2, figure 4).

¹ Canadian Entomologist, 46: 296, 1914.

This giant hornet is hairy, black, with dark, yellowish orange markings, the posterior extremity being mostly yellowish orange. It is about an inch long. Gillanders records injury by this insect in England to the young stems of ash, alder and elm, while Judeich and Nitsche, writing of German conditions, report it as stripping the bark from alder, linden, lilac, various willows, poplar, horse-chestnut, larch and oak.

The injury to the living twigs is usually very irregular in character and generally inflicted early in June or during July. It is caused by the hornets gnawing away the bark down to the sapwood, attacking twigs half an inch in diameter or less. The denuded area may be mostly on one side of the twig and extend for 10 to 12 inches, or it may be much more irregular and girdle the twig in several places. In the latter instance the portion beyond the affected part ultimately dies; in any event there is more or less disfiguration. The tissues removed are doubtless used in the construction of the paper nests, though some European authorities hold that the main purpose of this attack is to obtain the sap flowing from the wounds.

The life history of this species is very similar to that of our native *Vespa maculata* Linn., except that the nests are rarely found hanging free, being more generally built within cavities in a tree, in confined places in buildings, as between rafters and underground. The nests in trees may consist of a series of combs occupying the entire cavity, entrance to which is usually gained through a small opening. The underground nests are entered by a broad gallery which, turning up slightly at its extremity, gives access to the lower portion of the nest. The "paper" used in construction of the nest is considerably darker than that made by *Vespa maculata*.

Control measures. Ordinarily we would not expect serious injury to follow attacks by these hornets and, taken as a whole, it is probable that they are more beneficial than injurious. The damage to specimen trees in lawns and parks is certainly annoying and can be prevented only by reducing the number of the hornets or by applications of protective materials to the trees. The European authorities mentioned above suggest trapping the hornets by the use of long-necked flasks containing sweetened water. It is also practical to trace the insect, especially in early morning or on cool days, and thus locate the nest, which may be destroyed by the use of burning sulphur or carbon bisulfid, depending upon its location. This can be best done in the early evening, and great

care should be exercised to prevent the escape of the insects during the treatment and possible serious results to the operator, since the sting of this species is very painful.

The writer has suggested that more valued trees might be protected from attack, to a large extent at least, by spraying the branches with a poison, such as arsenate of lead used at the rate of at least 4 pounds to 50 gallons of water and adding thereto 3 to 4 pounds of soap. There would be a fair chance of the insects succumbing to the poison if the application was not sufficiently distasteful to ward off the hornets.

Elm leaf beetle (*Galerucella luteola* Müll.). The elm leaf beetle continues to be a serious pest of elms, particularly the European varieties, though the damage of the last few years has not been nearly so general as during the preceding decade, partly because of more general and thorough spraying. An interesting development the past season was the discovery by Prof. M. W. Blackman, State College of Forestry, Syracuse, of a well-established local infestation of the elm leaf beetle. Some years ago a few insects were received from Oswego and since then no additional spread has been recorded in that section. It is only a question of time, as has been repeatedly stated in other publications, when this pest will probably become well established and be decidedly injurious in most of the important cities and villages of New York State, aside possibly from some localities lying at high elevations or where climatic conditions are so rigorous as to prevent the pest multiplying freely.

In the report for 1912¹ we called attention to the influence adverse weather conditions in mid-June had upon an apparently vigorous generation which threatened serious and widespread injury to the elms. Observations at that time showed that this period of abnormally cool weather came at a time when oviposition should have been at its height. Somewhat similar conditions prevailed in the vicinity of Nassau, at least, last June, and a study of climatic conditions based upon the records of the United States Weather Bureau revealed an interesting correlation between arrest in the development of this insect and unseasonable cool weather. Owing to the fact that more detailed observations were made upon the development of the beetle at Nassau, the weather records for Chatham, less than 10 miles distant and the nearest recording station, were utilized. Earlier studies show that under normal

¹ N. Y. State Mus. Bul. 156, p. 48.

conditions oviposition by the elm leaf beetle begins the latter part of May and continues throughout June, being at its height in the middle of the month. The month of June was therefore divided into three ten-day periods and the maximum, minimum and effective temperatures tabulated for the past decade, namely, from 1905 to 1914. In one series of tabulations 43° F. was taken as the biological zero, and in the other 55° . These tabulations are given below.

Tabulation of maximum June temperature units, $55^{\circ}=0$

Days	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Average
I-10.....	185	287	110	257	175	101	192	182	191	215	189.5
11-20.....	280	231	257	255	209	219	213	189	254	199	230.6
21-30.....	215	272	309	305	296	272	221	279	287	234	269.0
Totals.....	680	790	676	817	680	592	626	650	732	648	689.1

Tabulation of minimum June temperature units, $55^{\circ}=0$

Days	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Average
I-10.....	-64	+31	-97	-46	-38	-143	-33	-60	-70	-10	-53
11-20.....	+61	-26	-36	-16	-24	+14	-8	-50	-22	-55	-18.2
21-30.....	-5	+26	+44	+43	+57	+26	+1	+16	+34	+16	+25.8
Totals.....	-8	+31	-89	-19	-5	-103	-40	-94	-58	-49	-43.4

Tabulation of effective June temperature units, $55^{\circ}=0$

Days	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Average
I-10.....	121	318	13	211	137	-42	159	122	121	205	136.5
11-20.....	341	205	221	239	185	233	206	139	232	144	214.5
21-30.....	210	297	343	348	353	298	222	195	321	250	283.7
Totals.....	672	820	577	798	675	489	587	456	674	599	634.7

Tabulation of maximum June temperature units, $43^{\circ}=0$

Days	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Average
I-10.....	305	407	220	377	295	221	312	302	311	335	308.5
11-20.....	400	351	377	375	329	339	333	309	374	319	350.6
21-30.....	335	372	429	425	416	392	341	299	407	324	373.8
Totals.....	1 040	1 130	1 026	1 177	1 040	952	986	910	1 092	978	1 033.1

Tabulation of minimum June temperature units, $43^{\circ}=0$

Days	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Average
1-10.....	58	151	27	80	82	33	87	70	67	110	76.5
11-20.....	169	101	84	104	98	134	113	75	95	73	105.5
21-30.....	115	146	186	163	177	146	121	135	154	137	148.0
Totals.....	342	398	297	347	357	313	321	280	316	320	329.1

Tabulation of effective June temperature units, $43^{\circ}=0$

Days	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	Average
1-10.....	363	558	247	457	377	254	399	372	378	445	365.0
11-20.....	569	452	461	479	427	373	446	384	469	392	425.2
21-30.....	450	518	615	488	593	538	462	434	561	561	522.3
Totals.....	1 382	1 528	1 323	1 424	1 397	1 165	1 307	1 190	1 408	1 398	1 352.7

Cool weather the first ten days in June, so far as conditions at Nassau and the elm leaf beetle are concerned, is very likely to be a continuation of earlier unseasonable weather and therefore to mean little more than a delayed development, and temperatures rarely drop the last of June to such an extent as to do more than somewhat retard biological processes. Generally speaking, the critical period is limited to the ten days from June 11th to 20th, inclusive. It will be seen by referring to the tables given above, that the maximum, minimum and effective temperatures for mid-June in both 1912 and 1914 are markedly lower than the average for the decade tabulated, with the possible exception of the year 1907, and here we have, especially in minimum temperatures, an approximation to conditions obtaining in the two years mentioned above, though it should be noted that the effective temperatures for the ten days under consideration exceed the average for the decade, conditions by no means obtaining for the same period in 1912 and 1914. It should also be noted in connection with the 1907 records, that the temperatures for the first period are considerably lower than the normal, and consequently it is evident that the season was an exceptionally late one, the low temperatures of the first part of June simply checking development without any special hazard to insect life.

There is a question as to what point should be taken as the biological zero in endeavoring to ascertain the effect of temperature upon animal life, and in this instance we have based our calculation upon two points and present below a comparison of data thus secured.

Comparison of deficiency in temperature units for June 11th to 20th

0 =	1912 43°	1912 55°	1914 43°	1914 55°
Maximum temperatures.....	41.6	41.6	31.6	31.6
Minimum temperatures.....	30.5	31.8	32.5	36.8
Effective temperatures.....	41.2	75.5	33.2	70.5

It will be seen by referring to the table, that so far as maximum and minimum temperatures are concerned the units are nearly identical, whether we start at 43° or 55°. This is far from the case, however, when we come to the effective temperatures, there being a much greater discrepancy when zero equals 55° than if we start

with 43° . The available data, so far as the elm leaf beetle and local conditions are concerned, justify the following tentative conclusions:

The inhibitory action of low temperatures is about equally evident in both maximum and minimum temperatures when 43° or 55° are taken as zero. The contrast is much more apparent in effective temperatures when calculations are based on 55° , and then the difference from the average approximates the sum of similarly obtained maximum and minimum units.

A reduction below the average of 30 to 40 units in either maximum or minimum temperatures or of 70 units in effective temperatures (if 55° is taken as 0) during a ten-day period when egg laying by the elm leaf beetle is normally at its height, checks oviposition and is very likely to be followed by an unusual mortality in both eggs and young grubs.

The relation existing between the development of the insect and the effect unusually low temperatures may have, should be always kept in mind, since if this is done we may be able to explain in part why the elm leaf beetle may be abundant and injurious in some sections and almost innocuous in others the same season, due to the fact that a widespread, cool wave would not have a uniform effect upon the insect, owing to its development being materially affected by local influences. Studies of other workers have shown that under normal conditions the rate of average variation for the beginning or ending of any biological phenomenon is not far from one day for every fourth of a degree of latitude or for every 100 feet of elevation. With this as a basis and the preceding regarding temperature in mind, it may be readily seen that a cool period might be very injurious to the elm leaf beetle at Nassau and comparatively harmless in the lower Hudson valley or on Long Island.

These facts in relation to temperature have a practical bearing, in that they give an approximate basis, at least, for determining the probability of serious injury locally before the brood has developed to such an extent as to damage the trees materially. It is easy to approximate the number of beetles which have overwintered by the amount of feeding upon the unfolding leaves, and now it seems possible to go further and determine in advance, with some degree of assurance, whether eggs and young grubs will thrive and develop normally, provided we have reasonably detailed information in respect to temperature conditions.

The calculation of temperature units is not a congenial occupation for the average man and we are therefore giving below the maximum and minimum temperature records for Chatham, N. Y., for 1910 to

1914 inclusive, so that comparison may be made between the two years 1912 and 1914 when unusually low temperatures checked the normal breeding of the elm leaf beetle, and those of 1910, 1911 and 1913, years when the insect was rather destructive and therefore presumably not checked by weather influences. The important period, as noted above, comprises June 11th to 20th, and the temperatures of 1912 should be compared with those for corresponding dates above or below and those for 1914 with the three normal years. It will be observed at once that the minimum temperature dropped considerably lower and more frequently during these two years, falling in 1912 to 38 on the 14th and to 46 or 45 on the 13th, 15th and 19th. There is a fall, though proportionately less, in the maximum temperatures. Somewhat the same conditions obtained during this ten-day period in 1914, except that the cool weather came from the 16th to the 20th, there being a period of six successive days, if we count the 21st, when the minimum ranged from 52 to 39. There was also a perceptibly lower maximum.

Adding the maximum and minimum temperatures and both combined, also given in our temperature tabulation, we likewise find during this ten-day period, a markedly lower average than for the same periods in the other years. This is so evident that we would suggest the following as a tentative rule: when the sum of the maximum and minimum temperatures (F.) for a ten-day period for or about the middle of June does not exceed 1250 units, the probabilities are that egg laying will be checked and that an unusual mortality will occur in both eggs and young grubs.

Maximum and minimum temperatures for Chatham, N. Y., June 1910-14 inclusive

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Mean
1910 Max..	56	60	70	61	63	70	68	68	72	63	59	63	78	82	86	80	78	77	82	84	89	89	84	84	77	82	77	81	81	84	74.7
Min..	45	46	46	38	37	49	49	48	44	50	52	53	50	54	59	61	60	59	60	56	61	59	62	55	51	57	61	63	52	55	53.1
1911 Max..	66	81	73	79	75	60	66	75	81	84	86	80	70	70	74	65	75	79	84	80	70	75	78	76	73	73	82	86	79	79	75.8
Min..	56	44	51	48	52	48	56	56	50	56	55	60	57	59	57	49	45	49	53	59	49	49	56	48	53	57	67	69	53	50	53.7
1912 Max..	82	88	80	82	66	64	62	66	66	76	80	77	70	70	67	68	83	73	73	78	77	79	82	87	84	86	80	85	89	80	76.7
Min..	44	54	64	57	51	51	49	35	41	44	49	50	46	38	46	55	62	51	45	58	64	54	50	52	62	66	49	56	65	48	51.9
1913 Max..	81	78	78	75	74	78	81	65	61	70	79	80	83	84	83	91	86	76	72	70	80	78	82	87	85	77	87	83	83	93	79.3
Min..	47	57	44	57	47	52	64	43	34	35	41	46	50	59	48	65	65	44	48	57	65	57	51	56	62	60	68	63	49	53	52.9
1914 Max..	78	72	74	67	67	74	86	83	75	89	85	89	68	73	74	66	73	80	74	67	75	76	80	92	88	88	78	69	71	67	76.5
Min..	55	46	44	55	47	58	62	61	56	56	53	56	53	51	54	50	39	48	52	40	42	57	55	65	65	54	58	59	56	55	53.4

Totals of Fahrenheit readings for ten-day periods, Chatham

	JUNE	MAXIMUM	MINIMUM	MAXIMUM AND MINIMUM
1910.....	1-10	651	462	1113
	11-20	769	564	1333
	21-30	822	576	1398
1911.....	1-10	740	517	1257
	11-20	763	543	1306
	21-30	771	551	1322
1912.....	1-10	732	490	1222
	11-20	739	500	1239
	21-30	829	566	1395
1913.....	1-10	741	480	1221
	11-20	804	523	1327
	21-30	835	584	1419
1914.....	1-10	765	540	1305
	11-20	749	496	1245
	21-30	784	566	1350

Gipsy moth (*Porthetria dispar* Linn.). Last May a fair-sized gipsy moth colony was discovered at Mount Kisco, Westchester county. The infestation was evidently of two or three years' standing. One oak was rather badly infested and the insects had spread from it to nearby smaller trees and shrubs on a stony hillside. There were several egg masses on trees some distance from the center of infestation. An agent of the State Department of Agriculture accompanied the Entomologist at the time of the initial examination, and although a few of the insects had commenced to hatch and it was therefore a little late to secure the best results, the outcome of the season's work leaves little to be desired. Efforts were concentrated upon creosoting egg masses, repeated and heavy sprayings with poison and banding with tree tanglefoot and burlap. Three weeks after the infestation was discovered only three or four small caterpillars were found alive in the center of the colony. Very few living larvae were seen later and on October 22d some hours' exploration resulted in finding no living egg masses.

Several seasons must elapse before it will be possible to say that extermination has been the outcome of the vigorous measures of last summer. Winter scouting may result in finding a few egg masses. There can be little difference of opinion as to the wisdom of adopting extreme measures in such an isolated infestation. The

nearest colonies known are on the border of Lenox and Stockbridge, Mass., and at Great Barrington. The first named is practically exterminated and the other on the verge of extinction. It is extremely important that these infestations be detected early and the insects destroyed if possible, otherwise the State of New York will soon have a serious gipsy moth problem comparable to that of the New England States.

Norway maple leaf hopper (*Alebra albostrisella* Fall.). The Norway maple is comparatively free from injurious insects and the reported severe injury to foliage by a leaf hopper was therefore unexpected. Mr F. A. Bartlett of the Frost & Bartlett Company, states that Norway maples in the vicinity of Stamford, Conn., are frequently seriously injured by this species, many leaves dropping in midsummer. Similar conditions were found to obtain in New Jersey in the vicinity of Morristown and also at certain Long Island localities. Under date of July 23, 1914, Mr Clinton C. Lawrence forwarded from Newburgh, N. Y., an excellent series of this species, together with leaves which showed severe and characteristic leaf hopper injury.

This small leaf hopper is only about one-eighth of an inch long and so far as specimens in the State collections are concerned, is mostly yellowish or yellowish orange. It is about the same size as the whiter and much better known rose leaf hopper and presumably has somewhat the same habits, though records concerning its life history and food plants are lamentably scarce. This leaf hopper is evidently quite variable, as it has been described under no less than seven different names in Europe and four in this country. It has been recorded in America from Canada south to Washington and west to Illinois and Michigan. Mr E. P. Van Duzee captured specimens at Hamburg, N. Y., "sweeping ferns and rank weeds," and it has been reported as occurring on pear and cherry. Melichar, in his work on the Cicadas of middle Europe, states that this species is quite abundant on oak. State Museum material indicates the occurrence of adults during July and August at Jamaica, Newburgh, Kingston, Phoenixia and Ausable Lake. These data, taken in connection with what is known of the insect, indicate a wide and general distribution.

This species was first recorded in America in 1864. It probably subsists for the most part upon comparatively valueless plants, though the above-mentioned injury indicates a probable change in food habits and the possibility of it becoming of considerable economic importance. Mr Bartlett states that last year he was able to con-

trol the leaf hopper almost entirely by spraying with black leaf 40 early in the spring, and that the results obtained have not been so satisfactory this season, although the work was very thoroughly done. There is obvious need of further information concerning the habits of this insect. An excellent bibliography is given by Prof. C. P. Gillette in the Proceedings of the United States National Museum, 1898, 20:713.

Pine leaf scale (*Chionaspis pinifoliae* Fitch). The nearly snow-white scales of this pest contrast strongly with the rich green of the pine needles, making the insect very conspicuous. It is a form (plate 2, figure 5) reported almost every year and occasionally twigs are received showing a very severe infestation, which was the case with material transmitted for identification from Flushing and Plattsburg. The specimens of the former lot proved to be abundantly infested by small four-winged parasites; hundreds of *Aspidiotiphagus citrinus* Craw. and smaller numbers of *Aphelinus mytilaspidis* LeB. were obtained and subsequently kindly determined by Dr L. O. Howard of the Federal Bureau of Entomology. A third parasite, *Perrisopterus pulchellus* How., has also been reared from this pine scale. Occasionally this pest multiplies excessively and seriously weakens trees or groups of trees. This was particularly noticeable a few years ago in the case of some Austrian pines growing in Washington Park, Albany.

The reddish young of this scale hatch about the middle of May in the latitude of Albany, most of the insects establishing themselves upon the tender needles at the ends of the twigs. The hatching period is protracted and, as a consequence, there is more or less overlapping of the two and possibly three generations annually, according to the observations of Prof. R. A. Cooley at Amherst, Mass.

The crawling young of this insect can be destroyed by spraying with a contact insecticide such as black leaf 40, used at the rate of three-fourths of a pint to 100 gallons of water, to which is added 5 or 6 pounds of soap. Some practical tree men are using a miscible oil diluted 1 to 16 and making the application before the buds have started. This treatment is said to be very successful and to cause no injury to the trees, provided the work is done before the buds have started and become soft.

Scurfy scale on Norway maple (*Leucaspis japonica* Kll.). The Norway maple is exceptionally free from insect pests in America and we were therefore surprised to receive from the Frost

& Bartlett Company, Stamford, Conn., twigs and leaves of this tree showing a somewhat severe infestation by the above-named insect. Several trees were infested and at least one was in a weakened condition. The scale has much the shape of that of *Lepidosaphes ulmi* Linn., except that it is somewhat broader. It is a small species, being only 1.5 to 2 mm long and a dull grayish white (pure white when the scale is first secreted). The twig submitted for examination was thickly infested, while small numbers of the scale insects had established themselves at the base of the principal leaf veins with scattering individuals ranged along the veins to the middle of the leaf. The absence of the tricarinate male scales characteristic of *Chionaspis*, serves at once to distinguish the common scurfy scale from this much rarer form. The insect was also found on an adjacent privet hedge.

There is very little literature relating to this species. It was described in 1897 by Professor Cockerell from specimens taken on broom shipped from Japan by Mr Alex. Craw the preceding year, and subsequently it was found by Mr Craw on *Magnolia souliana* and maples, species not indicated, from the same country. There are specimens in the State collection on orange, received from Mr S. I. Kuwana, which, while closely allied, do not appear to be identical with the form taken on Norway maple.

Spruce bud scale (*Physokermes piceae* Schr.). The smaller twigs of Norway spruce, especially those infested with the spruce gall aphid, *Chermes abietis* Linn., are occasionally in a weakened, dying condition and, in some instances at least, are rather badly infested by this scale insect. This peculiar pest establishes itself at the base of the branchlets, there sometimes being clusters of two to five or even six of the oval, chestnut-brown scale insects on a twig having a diameter of less than one-eighth of an inch. Each of these very closely resembles a somewhat abnormally developed bud and is easily mistaken for such (plate 3, figure 3). Spruce twigs suffering from the attack of this insect are often received in early July, at which time the young may be found under the mother scales. An observation made some years ago shows that occasionally this scale insect may be extremely abundant, since Prof. Burton M. Gates records that in May and June 1908, bees were attracted in large numbers to spruce trees at Amherst, Mass., by copious exudations of honeydew produced by this bud-resembling scale. The many bees attracted produced a noise suggestive of swarming. The extraction of any such amount of honeydew from a tree must mean a serious reduction in its vitality, and as this scale

insect is frequently associated with dying branchlets, we are inclined to believe that it is an important factor in disfiguring many Norway spruces. Gillanders states that in England healthy spruce trees are not appreciably affected by the presence of this scale insect, though weakly ones are sometimes killed by it and the associated *Chermes abietis* Linn.

This species has, to our knowledge, become established in Brooklyn, Mount Vernon, Albany and Port Henry, and is probably widely and somewhat generally distributed in the State. The winter is presumably passed by the partly grown young which, according to Gillanders, are rather effectually hidden on the small twigs. Newstead has reared from this insect a Chalcid, *Eneirtus scaurus* Walk., and it is commonly believed that natural enemies are very effective checks.

The most promising method of controlling this scale insect is by spraying in early spring with a contact insecticide, especially with an oil as for the somewhat closely related *Lecaniums*.

False maple scale (*Phenacoccus acericola* King). The report of this office for 1913, page 59, describes a very serious infestation by this insect upon certain hard maples near the New Haven Railroad station at Mount Vernon. These were so badly infested in 1913 that practically every leaf bore six to twenty-five of the conspicuous cottony females, while the portions between were thickly spotted and, in some instances, practically coated with the numerous yellowish young. The trunks were also liberally plastered with the white cocoons of the male.

An examination of this tree in September last, showed it to be in a somewhat weakened condition, there being a few limbs bare of leaves and a few small, dead branches. The infestation was not nearly so severe as that of a year ago, though the trunk of the tree was irregularly spotted with the white cocoons and a large proportion of the leaves bore cottony females, there being three to five on almost every leaf. The observation shows that while this insect may become exceedingly abundant in the fall, such an outbreak is not necessarily very injurious to the trees.

Mulberry white fly (*Tetraleurodes mori* Quaint.). Leaves of the Mountain Laurel, *Kalmia latifolia*, were received in July from Mount Kisco through the State Department of Agriculture and found to be rather thickly infested with this white fly. The oval, black insects about one-thirty-fifth of an inch long and margined with a white, waxy secretion which approximately doubled their size, presented a striking appearance.

This species was originally described from Florida and at that time recorded on the leaves of mulberry, linden, *Tilia americana*, French mulberry, *Callicarpa americana*, sweet gum, *Liquidambar styraciflua*, American holly, *Ilex opaca* and less frequently on Red Bay, *Persea borbonia*. In addition, Doctor Britton¹ has recorded the occurrence of the variety, *maculata* Morr., in Massachusetts and Connecticut on ash, hornbeam, Catalpa and hickory, and states that this species should also occur in New Jersey.

FOREST TREE PESTS

Spruce bud moth (*Tortrix fumiferana* Clem.). The abundant flights of this small, brownish moth have attracted attention here and there for several years, being indications of the insect breeding in large numbers. There has been considerable injury to spruces in certain Adirondack localities, though the damage does not seem to approach that recorded from sections in Maine.

The past season was marked by complaints of the work of the caterpillar upon ornamental spruces from Tarrytown, Albany and Schenectady. In one instance, at least, the blue spruce was attacked. The reports were received early in June at the time the small, brownish caterpillars, about three-fourths of an inch long and rather easily recognized by the slightly flattened body and the series of large, yellowish white tubercles or warts, were full grown. Early spraying with arsenate of lead, using 3 pounds to 50 gallons of water, is the most promising method of checking this insect whenever its abundance necessitates remedial measures.

Ugly nest cherry worm (*Archips cerasivorana* Fitch). The silken webs of the yellow, black-headed caterpillars of this chokecherry leaf feeder were unusually abundant the latter part of June in southern Rensselaer and northern Columbia counties. In some cases extended patches along the roadside were covered with the webs of this caterpillar. The full-grown larvae are lemon-yellow, clothed with scanty, fine, yellowish hairs, the head, the prothoracic shield, the anal shield and the true legs being black, while the mouth parts are brown. Transformations occur within the webs, the pupae wriggling partly out of the nest before the disclosure of the variable yellow and leaden-blue moths. This leaf-feeder confines itself to chokecherry and is therefore of no economic importance though its conspicuous nests frequently arouse apprehension.

¹ Insects of New Jersey, p. 120, 1909.

Maple and oak twig pruner (*Elaphidion villosum* Fabr.). Small, clean-cut twigs of oak, maple or other trees falling during the summer or hanging in a wilting or dry condition, are the most striking signs of this insect's work. Numerous reports were received the past season concerning injuries by this insect, especially from the vicinity of New York City. Incidental observations along the Hudson valley showed that this borer was unusually abundant. It confines its operations largely to the smaller twigs, rarely cutting branches with a diameter more than three-fourths of an inch. Limbs injured by this borer have the central portion traversed to a greater or less extent by a somewhat irregular gallery inhabited (plate 3, figure 1) by a legless grub about three-fourths of an inch long. The parent insect is a grayish brown beetle with a length of about five-eighths of an inch. The habit of cutting off the limbs, leaving only a small portion of the bark or outer sapwood, affords an excellent means of identifying the depredator and distinguishes its operations at once from the wilting of twigs resulting from the oviposition scars of the periodical Cicada, *Tibicen septemdecim*, or the death of small twigs as a result of fungous infection.

Normally the grubs fall with the severed leaves and remain in their retreats over winter, consequently the systematic collecting and burning of the fallen branches is the most economical method of checking this borer. Ordinarily it does not cause serious injury, though the brown, dead tips produce a very unsightly appearance.

Periodical cicada (*Tibicen septemdecim* Linn.). Injuries by this insect are limited almost entirely to the damage caused by oviposition, especially in young trees, since the latter are much more liable to be severely affected. An interesting case came under observation last summer; the trees belonged to Mr Hubert Gage of Rhinebeck, and the initial injury was caused in 1911. Many of those badly affected were much stunted, and the most seriously damaged twigs had made little or no growth.

In a few cases there was during the past three years, less than ten inches of growth, and in one or two instances the comparatively vigorous development of last year had withered and died during late summer, probably as a result of a deficient supply of sap, owing to the interference of circulation by the abnormal tissues below.

The obvious conclusion is that in the case of badly injured young trees it is highly desirable to eliminate as much of the injured wood as possible, even though severe cutting must be done for two or three years, because it was evident from the condition of some of these trees that limbs showing numerous scars would amount to very

little so far as crop production was concerned. This is particularly true in cases where there is a series of two or three nearly contiguous scars, since the chances are that such limbs will break off with the first heavy load of fruit, if not earlier.

MISCELLANEOUS

Orchid pests. The orchid *Isosoma*, *I. orchidearum* Westw., is a European insect which was first discovered in this country in 1889 at Natick, Mass., undoubtedly being introduced with imported plants, since Riley in 1880 records the pest as quite common in some Paris conservatories. The species has apparently not attracted notice subsequently until infested bulbs were received last July from Mount Kisco, accompanied by the statement that they had been taken in a local conservatory. Several species of *Cattleya*, notably *C. trianae*, *C. eldorado* and *C. gigas*, are liable to infestation. During the resting season of these plants the pseudo-bulbs may suddenly start into activity, increase rapidly in size and assume a spherical shape, according to Prof. A. P. Morse of Wellesley. Within these pseudo-bulbs there is an irregular cavity containing three to eight white maggots. The insects complete their transformations within the cavity and emerge as small, greenish, four-winged gall wasps.

Infested bulbs fail to produce flowers and the consequent abnormal growth, if the insects are numerous, reduces the vitality of the plants to such an extent that they gradually wither and die in two to three years.

The *Cattleya* midge, *Parallelodiplosis cattleyae* Moll., lives as a yellowish maggot near the tips of the roots of these orchids, producing unsightly galls, in which one to seven maggots occur, each in a cavity by itself. This insect is quite different from the preceding and is one of a very large number of gall midges which live at the expense of many different kinds of plants.

The most satisfactory method of controlling both of these insects is to keep a close watch of the plants and promptly destroy by burning any infested parts before the larvae can mature and the parent flies deposit eggs upon other orchids. Fumigation has also been advised for the destruction of the adults, though the probabilities are that this would be comparatively inefficient, owing to the difficulty of timing the treatment so as to catch numbers of the flies before they have had an opportunity to deposit eggs. It is by all means desirable to adopt reasonable precautions for preventing the introduction of infested plants, and measures of this character will produce much more satisfactory results than is possible by remedial treatment.

Cotton moth (*Alabama argillacea* Hübn.). The appearance of this southern moth in New York State is interesting, though by no means unprecedented, since it was recorded in 1911 from three New York counties and in 1912 from sixteen, the specimens being taken mostly in September and October.

September 25th C. C. Laney, superintendent of Rochester parks, transmitted a number of specimens with the statement that they had been flying around the city in great numbers for several days. Mr M. S. Baxter of the same city also forwarded specimens which he stated had literally swarmed for two days around the electric lights. On October 20th, he forwarded additional moths with the statement that they had appeared in such numbers that it hardly seemed possible they had remained about the city since the great flight of September 25th. A number of the moths, some perfect, unrubbed specimens were observed Monday morning, October 19th, here and there under electric lights on State street, Albany. It was easy to find three to ten or even fifteen specimens about a light. A similar though smaller flight of these insects was also observed on the morning of the 21st. At the latter date there were equal, if not larger, numbers of the lime tree winter moth, *Erannis tiliaria* Harr. English sparrows were observed feeding eagerly upon the adults of both species.

Phlyctaenia terrealis Treits. Small, greenish caterpillars webbing together the tips of the Marsh Shield fern, *Dryopteris thelypteris*, were received June 19, 1914 from S. H. Burnham of Hudson Falls. The terminal leaves were drawn together in an irregular, webbed retreat some 2 cm in diameter, the interior being hollow and partly filled with frass. Meyrick records this species as living on *Solidago virgaurea* and gives its distribution as central Europe, western central Asia and North America. Detailed descriptions of the larva and pupa follow.

Larva. Length 2 cm. Head a variable yellowish orange, with irregular, lighter anastomosing striations. Ocelli five in number, whitish transparent, arranged in a semicircle variably margined with dark brown. Labrum yellowish, mandibles yellowish basally, changing to reddish brown, the teeth dark brown. Antennae tri-articulate, the basal segment stout, with a length one-fourth greater than its diameter, whitish transparent, brown-margined, the second segment slender, with a length three times its diameter, light brown, the third segment as long as the second, more slender, tapering apically. Body a somewhat variable light green, being darker along the dorsal vessel, the tubercles whitish and fuscous margined. Thoracic shield a variable yellowish brown, there being irregular,

darker brown markings laterally and at the latero-posterior angles; laterally an irregular, fuscous brown sclerite extends from below the spiracle to the anterior margin of the segment. Second and third thoracic segments, each with two pair of submedian, irregularly oval bisetose tubercles, the pair on the second segment approximate; laterally near the stigmatal line there are two tubercles, the anterior irregular, bisetose, the posterior nearly circular, unisetose; at the base of each true leg a large, irregularly angular, unisetose tubercle. Abdominal segments with two pair of submedian tubercles, the anterior broadly oval, the posterior narrowly oval and more distant, both unisetose; laterally just above the spiracle an angulate, unisetose tubercle and a little below the spiracle an oval, bi- or trisetose tubercle; the 13th segment with a large median, ovoid, polysetose tubercle, the suranal plate with about 8 long, stout, reddish setae; true legs yellowish with variable, darker brown markings; prolegs whitish transparent, the circle of claws reddish brown.

Pupa. Length 3 mm, mostly a slaty reddish brown, the lateral anterior angles of the mesonotum marked by an oval elevation, the central portion of which is yellowish brown; the first to fourth abdominal segments narrowly margined dorsally next the wing pads with fuscous yellowish, the incisures yellowish, cremaster consisting of about 8 slender, yellowish red spines. Leg, antennal and ventral third of wing cases an obscure yellowish, the spiracles reddish orange.

Red spider (*Tetranychus telarius* Linn.). Red spiders, according to reports received from Mr W. H. Hart of Arlington, became so abundant the latter part of July in a young apple orchard, that it was deemed advisable to spray for the purpose of controlling the pest. A thorough application of a lime-sulphur wash diluted 1 to 45 and containing 2 pounds of arsenate of lead to 50 gallons of water, was made and about two weeks later Mr Hart reported the treatment as being extremely efficacious, the sprayed trees being almost wholly free from the red spider, while the unsprayed trees were badly infested and showed perceptibly browner foliage. The sulphur wash was undoubtedly the efficient agent in this treatment.

LIST OF THE COCCIDAE IN THE COLLECTION OF THE NEW YORK STATE MUSEUM

BY F. T. HARTMAN

There are in the New York State Museum at the present time, 173 species of scale insects, of which 68 are found in New York, 41 have been received in exchange from Japan and the others are from widely separated places in the United States. The greater part of these have been received in recent years, but a few date back to the time of Doctor Fitch. Among these are three microscopic mounts of *Aspidiotus furfurus* Fitch, now *Chionaspis furfura*. Two bear the label: "Female from under a scale, labeled by Dr Asa Fitch as *Aspidiotus furfurus*, mounted by J. Henry Comstock, 28 December 1880." The third is labeled: "Female from under a scale, labeled by Dr Asa Fitch as *Aspidiotus cerasi*. It is specifically the same as *Asp. furfurus* Fitch, J. Henry Comstock, 28 December 1880." There is always a certain amount of material coming in which proves, on microscopic identification, to be one or another of several common and well-distributed forms. Such common species as *Gossyparia spuria*, *Pulvinaria acericola*, *P. vitis*, *Lecanium corni*, *L. prunastri*, the plum scale, *Chionaspis furfura*, the scurfy scale, *C. pinifoliae*, *Aulacaspis rosae*, *Aspidiotus ostreaeformis*, the San José scale and *Lepidosaphes ulmi* are, like the poor, "always with us." Nine types and seven cotypes are represented and those with microscopic mounts are indicated by the asterisk.

COCCIDAE

Subfamily Monophlebinae

Drosicha lichenoides Ckll.

On *Ficus nota*

From Los Banos, P. I.

Received from C. F. Baker, through T. D. A. Cockerell, Boulder, Col.

Icerya purchasi Mask., cottony cushion scale

On Scotch broom and *Acacia*

From Albany, N. Y.

Received through L. Menand; also from Leland Stanford University, Cal., S. I. Kuwana, through V. L. Kellogg

- I. *seychellarum* West.
From Okitsu, Japan
Received from S. I. Kuwana, Tokio, Japan
- I. *zeteki* Ckll., type
From Panama Canal Zone
Received from James Zetek, through T. D. A. Cockerell, Boulder,
Col.

Subfamily Dactylopiinae

- Asterolecanium pustulans* Ckll.
From Chatham, N. Y.
Through State Department of Agriculture
- A. *variolosum* Ratz., golden oak scale
On golden oak
From Flushing, Cortland, Geneva, Newburgh, Woodlawn Cemetery, N. Y.
Received from Mrs George W. Rains and also from S. I. Kuwana,
Leland Stanford University, Cal., through V. L. Kellogg
- Lecaniodiaspis quercus* Ckll.
On *Quercus* species
From Tokio, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.
- Cerococcus ehrhorni* Ckll.
On live oak
From California
Received from E. M. Ehrhorn, through V. L. Kellogg, Leland
Stanford University, Cal.
- C. *quercus* Comst.
On oak
From California
Collected by E. M. Ehrhorn
- Kermes cockerelli* Ehrh.
On *Quercus kelloggi*
From California
Received from George B. King, Lawrence, Mass.
- K. *essigii* King
On *Quercus agrifolia*
From California
Received from George B. King, Lawrence, Mass.

- K. galliformis* Riley
From Karner and Middletown, N. Y.
Received from George B. King, Lawrence, Mass.
- K. kingii* Ckll.
On oak
From Albany, N. Y.
- K. nivalis* King & Ckll.
On *Quercus rubra*
From Lawrence, Mass.
Received from George B. King.
- K. pubescens* Bogue
On white oak
From Lawrence, Mass.
Received from George B. King
- K. vastis* Kuw.
On *Quercus*
From Niigata, Japan
Received from S. I. Kuwana, Tokio, Japan
- Gossyparia spuria* Mod., European elm scale
On various species of elm; widely distributed throughout the State
Also from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.
- Eriococcus adenostomae* Ehrh.
On *Adenostoma fasciculatus*
From California
Received from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.
- E. araucariae* Mask.
On *Araucaria excelsior*
From California
Received from G. A. Coleman, through V. L. Kellogg, Leland Stanford University, Cal.
- E. artemisiae* Kuw.
On *Artemisia californica*
From California
Received from V. L. Kellogg, Leland Stanford University, Cal.
- E. azaliae* Comst.
On azalia
From Brooklyn, N. Y.

- E. borealis* Ckll.
On Betula
From Boulder, Col.
Received from T. D. A. Cockerell
- E. graminis* Mask.
On bamboo
From Gifu-keu, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.
- E. lagerstroemia* Kuw.
On Lagerstroemia indica
From Nishigahara, Tokio, Japan
Received from collector Fukaya, through S. I. Kuwana, Tokio,
Japan
- Dactylopius coccus* Costa, cochineal insect
On cypress
From California
Received from G. A. Coleman, through V. L. Kellogg, Leland
Stanford University, Cal.
- D. confusus* Ckll.
On Cupressus macnabiana
From California
Received from G. A. Coleman, through V. L. Kellogg, Leland
Stanford University, Cal.
- Phoenicococcus marlatti* Ckll.*
On date palm
From Arizona
Received from T. D. A. Cockerell, Boulder, Col.
- Halimococcus lampas* Ckll., type
On palm
From Natal
Received from Claude Fuller, through T. D. A. Cockerell, New
Mexico
- Phenacoccus acericola* King*
On hard maples; abundant in the Hudson valley
- P. pergandei* Ckll.
On Kaki
From Shigoken, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.

Trionymus violascens Ckll., type

On Agropyron

From Colorado

Received from T. D. A. Cockerell, Boulder, Col.

Pseudococcus adonidum Linn., long-tailed mealy bug*

Grown indoors

From Winfield, N. Y.

Received from C. E. Olsen

P. citri Risso, short-tailed mealy bug

On Ipomoea learii

From Florida

P. ledi Ckll., cotype*

On Ledum groenlandicum

From Sand Lake, N. Y.

Received from C. H. Peck

P. pseudonipae Ckll.

On palm in nursery

From California

Received from E. M. Ehrhorn, through V. L. Kellogg, Leland
Stanford University, Cal.*Cryptococcus fagi* Baer.

On beech

From Canada

Received from R. W. Braucher, Kent, O.

Antonina crawi Ckll.

From Tokio, Japan

Received from S. I. Kuwana

*Subfamily Tachardiinae**Tachardia glomerella* Ckll., type

On Gutierrezia

From New Mexico

Received from T. D. A. Cockerell, Boulder, Col.

*Subfamily Coccinae**Takahashia japonica* Ckll.

From Yamagata, Japan

Received from S. I. Kuwana, Tokio, Japan

Pulvinaria acericola Walsh, cottony maple leaf scale

Common through the State

- P. aurantii* Ckll.
On *Thea sinensis*
From Tokio, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.
- P. citricola* Kuw.
On Citrus tree
From Tokio, Japan
Received from S. I. Kuwana
- P. hazae* Kuw.
From Tokio, Japan
Received from collector Murata, through S. I. Kuwana
- P. horii* Kuw.
On maple
From Tokio, Japan
Received from collector Fukaya, through S. I. Kuwana
- P. idesiae* Kuw.
On *Idesia polycarpi*
From Tokio, Japan
Received from collector Fukaya, through S. I. Kuwana
- P. occidentalis subalpina* Ckll., part of type
From T. D. A. Cockerell, Boulder, Col.
- P. oyamae* Kuw.
On *Populus*
From Niigata, Japan
Received from collector Yoshino, through S. I. Kuwana, Tokio,
Japan
- P. photiniae* Kuw.
On *Photinia villosa*
From Tokio, Japan
Received from S. I. Kuwana
- P. rhois* Ehrh.
On *Rhois diversiloba*
From California
Received from E. M. Ehrhorn
- P. vitis* Linn., cottony maple scale
Common through the State
- Protopulvinaria longivalvata bakeri* Ckll., cotype
From Los Banos, P. I.
From C. F. Baker, through T. D. A. Cockerell, Boulder, Col.

Pseudophilippia quaintancii Ckll.

On pitch pine

From Orange, N. Y., and Pike, Pa.

Received from H. A. Fredenberg, Port Jervis, N. Y.

Eriopeltis coloradensis Ckll., type

From Boulder, Col.

Received from T. D. A. Cockerell

E. lichtensteinii Sign.

On grass

From Stark, N. Y.

Received from C. O. Houghton

Ericerus pela Chav.

On *Ligustrum itola*

From Tokio, Japan

Received from S. I. Kuwana

Ceroplastes brunneri Ckll., part of type

From San Bernardino, Paraguay

C. ceriferus And.

On tea

From Kiushiu, Japan

Received from S. I. Kuwana, Tokio, Japan

C. cirripediformis Comst., Barnacle wax scale

On China tree

From Louisiana

C. floridensis Comst., Florida wax scale

On leaves of *Persea carolinensis*

From Florida

C. sanguineus Ckll.

From Paraguay

Received from T. D. A. Cockerell, Boulder, Col.

Eucalymnatus tessellatus Sign., tessellated scale

On fern

From California

Received from S. I. Kuwana, Tokio, Japan

Coccus diversipes Ckll., part of type

On fern

From Lucena, P. I.

Received from collector Townsend

- C. hesperidum* Linn., soft brown scale*
On English laurel and begonia
From Ogdensburg, Chatham Center, Irvington, N. Y.
Received from C. J. Locke and State Department of Agriculture
- C. salicis* Fitch
On Willow
Received from New York State Agricultural Society
- Neolecanium sallei* Sign.
From Guatemala
Received from Dr William M. Wheeler
- Toumeyella liriodendri* Gmel., tulip soft scale
On tulip tree and Magnolia; common in southern part of the
State and in parks
- T. turgidum* Ckll.
On stems of Magnolia glauca
From Florida
- Eulecanium glandi* Kuw.
From Tokio, Japan
Received from S. I. Kuwana
- E. pyri* Schr.
From Scriba, N. Y.
Received from Dr A. C. Taylor
- Saissetia hemispherica* Targ. Hemispherical scale
On Ardesia crenulata and mistletoe: common in greenhouses
- S. nigra* Nietn., black scale*
On Gossypium
From St Vincent, W. I.
Received from W. H. Patterson
- S. oleae* Bern., olive scale
On laurel and lemon
From Maspeth, N. Y.; also from E. M. Ehrhorn, California
- Physokermes insignicola* Craw.
On Pinus radiata
From California
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.
- P. piceae* Schr.
From Mount Vernon, N. Y.

Aclerda californica Ehrh.

On bunch grass

From California

Received from E. M. Ehrhorn

A. tokionis Ckll.

On bamboo

From Tokio, Japan

Received from S. I. Kuwana, and also from California through
V. L. Kellogg, Leland Stanford University, Cal.

Lecanium caryae Fitch, hickory Lecanium

Collection of the New York Agricultural Society

L. corni Bouché

On a great variety of plants; common over the State

A specimen in the collections of the New York State Museum labeled by the late Doctor Fitch as *Coccus salicis* was submitted to Prof. J. G. Sanders for determination. He has identified it as *L. corni* and writes: "*Coccus salicis* is *L. corni* in part, as is shown by the specimen. However, the material labeled *Coccus salicis* in the original collection now at Washington included also specimens of *Pulvinaria vitis*. It appeared that Doctor Fitch did not distinguish between *Lecanium* and *Pulvinaria*, as several of his original notes refer to the curious fact that some *Lecaniums* produce a cottony ovisac while others do not."

L. fletcheri Ckll.

On *Juniperus virginiana*

From Ithaca, N. Y. and also Columbus, O.

Received from J. G. Sanders

L. juglandis Bouché, New York plum scale*

On plum

From Kinderhook, Rochester, Menands and Western New York

L. kunoensis Kuw.

On *Rosa rugosa*

From Hokkaido, Japan

Received from S. I. Kuwana, Tokio, Japan

L. persicae Fabr., European peach scale

On rambler rose and *Magnolia*

From Warsaw, Port Ewen, Ravena and Idlewild, N. Y.

L. nigrofasciatum Perg., terrapin scale

On soft maples

Common through the State

L. nishigaharae Kuw.

On *Morus alba*

From Tokio, Japan

- L. pruinosa* Coq., frosted scale
On grape and trumpet vine
From Leon and Brighton
Received from C. E. Eldredge
- L. prunastri* Fonsc., plum Lecanium
On cherry, *Ardesia crenulata* and plums; common through the State
- L. quercifex* Fitch
On chestnut and ironwood
From Leon, New Russia, Bolton Landing, Lake George, N. Y.
Received from New York State Agricultural Society, C. E. Eldredge and Miss E. S. Blunt
- L. rugosa* Sign.
From Kingston, R. I.

Subfamily Diaspinae

- Chionaspis americana* Johns., elm white scale
On elm, Japanese quince, etc.
From Albany, Newark, Schenectady, N. Y.
Received from J. J. Barden, State Department of Agriculture and W. B. Landreth
- C. bambusae* Ckll.
On bamboo
From Tokio, Japan
Received from S. I. Kuwana
- C. citri* Comst., orange *Chionaspis*
On Citrus
From Nagasaki, Japan
Received from S. I. Kuwana, Tokio, Japan
- C. corni* Cooley
On *Cornus sanguinea*
From Geneva, N. Y.
Received from B. D. Van Buren
- C. euonymi* Comst., *Euonymus* scale*
On *Prunus pissardi* and *Euonymus*
From Nyack, Hudson Heights, Irvington, Great Neck, Roslyn, Fishkill, N. Y.
Received from Mrs E. H. Maire and E. C. Powell
- C. furfura* Fitch, scurfy scale
On various fruit trees; common through the State

- C. gleditsiae* Sand., cotype*
On *Gleditsia triacanthos*
From Columbus, O.
Received from J. G. Sanders
- C. hikosani* Kuw.
On bamboo
From Tokio, Japan
Received from S. I. Kuwana
- C. kiushiuensis* Kuw.
On *Quercus* sp.
From Buzen, Japan
Received from S. I. Kuwana, Tokio, Japan
- C. lintneri* Comst.*
On Cornus
From Buffalo, Albany, Rochester and Nassau, N. Y.
- C. longiloba* Cooley
On *Populus deltoides*
From Painesville, O.
Received from O. H. Swezey, through J. G. Sanders
- C. orthobis* Comst., cottonwood scale
On dogwood
From California
Received from V. L. Kellogg, Leland Stanford University, Cal.
- C. pinifoliae* Fitch, pine leaf scale*
On pines
From Keene Valley, Plattsburg, Karner, Flushing, N. Y. and
also from V. L. Kellogg, Leland Stanford University, Cal.
- C. quercus* Comst.*
On *Quercus chrysolepis*
From California
Received from E. M. Ehrhorn
- C. salicis* Linn., willow scale*
On poplar
From Albany, N. Y.
Received from S. H. Burnham
- C. salicis-nigrae* Walsh*
On *Salix cordata*
From Columbus, O.
Received from J. G. Sanders

C. spartinae Comst.

On *Spartina*

From Orient Point, N. Y.

Received from Roy Latham; also from California, S. I. Kuwana,
through V. L. Kellogg, Leland Stanford University, Cal.

Diaspis boisduvalii Sign.*

On *Phoenix canariensis* and greenhouse material in greenhouses

D. bromeliae Kern.

On Palm

From California

Received from E. M. Ehrhorn

D. carueli Targ., Juniper scale*

On Irish Juniper, pine, Swedish Juniper

From Rochester, Sing Sing and Kingston, N. Y.

Through State Department of Agriculture

D. echinocacti Bouché, Cactus scale*

On *Cereus grandiflora*

From New York City

Received from L. H. Joutel

D. zamiae Morg.*

On greenhouse material

From Altamont, Albany, N. Y.

Aulacaspis crawii Ckll.

On Yumi

From Tokio, Japan

Received from S. I. Kuwana

A. pentagona Targ., West Indian peach scale*

On imported material and from the South

From New York City, Kingston, Chatham, N. Y. and Washington, D. C.

A. rosae Bouché, rose scale*

On rose, raspberry, blackberry; common through the State

Phenacaspis mischocarpus Ckll. & Rob., cotype

On *Mischocarpus*

From Los Banos, P. I.

Received from C. F. Baker, through T. D. A. Cockerell, Boulder,
Col.

P. natalensis Ckll., type*

On Mango

From New Mexico

Received from T. D. A. Cockerell, Boulder, Col.

Hemichionaspis aspidistrae Sign.

On *Cycas revoluta*, greenhouse

From Albany, N. Y.

H. minor? Mask.

On orange

From Japan

Received from J. R. Anderson, Victoria, B. C.

H. uvariae Ckll. & Rob., cotype

On *Uvaria*

From Los Banos, P. I.

Received from C. F. Baker, through T. D. A. Cockerell, Boulder, Col.

Poliaspis carissae Ckll., type*

On *Carissa*

From Natal

Received from Claude Fuller, through T. D. A. Cockerell, Boulder, Col.

P. pini Mask.

On *Abies firma*

From Tokio, Japan

Received from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.

Leucaspis japonica Ckll.*

On Norway maple

From Stamford, Conn.

Also on orange from S. I. Kuwana, Japan

L. kelloggi Coleman*

On *Abies concolor*

From California

Received from G. A. Coleman, through V. L. Kellogg, Leland Stanford University, Cal.

Fiorinia fioriniae japonica Kuw.*

On *Tsugae seboldi*

From Long Island

Through Dr G. G. Atwood

Epidiaspis piricola Del Guer*

On imported pear

Through State Department of Agriculture

Aspidiotus abietis Schr.*

On hard pine, hemlock

From Ithaca and Karner, N. Y.

A. aesculi Johns.

On buckeye

From California

Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.*A. ancylus* Putn., Putnam scale*

On fruit and forest trees; widely distributed

A. caldesii Targ.*On *Pinus ponderosa*

From California

Received from G. A. Coleman, through V. L. Kellogg, Leland
Stanford University, Cal.*A. coniferarum* Ckll.*

On Cypress

From California

Received from G. A. Coleman, through V. L. Kellogg, Leland
Stanford University, Cal.*A. cryptomeriae* Kuw.

From Okayama, Japan

Received from S. I. Kuwana, Tokio, Japan

A. forbesi Johns., cherry scale*

On fruit trees; widely distributed

A. glanduliferus Ckll.*On *Pinus sylvestris*

From Columbus, O.

Received from V. L. Kellogg, Leland Stanford University, Cal.

A. hederæ Vall., oleander scale*

On a variety of plants in greenhouses; common

A. juglansregiæ Comst., walnut scale*

On maple, European mountain ash

From Brighton and Albany, N. Y.

A. lataniae Sign.*On *Areca lutescens*, greenhouse

From Albany, N. Y.

A. osborni New. & Ckll.*

On oak

From Mount Vernon, N. Y.

A. ostreaeformis Curt., European fruit scale*

On horsechestnut, pear, plum, apple, peach etc.; widely distributed

- A. perniciosus* Comst., San José scale*
On fruit and shade trees of many sorts; abundant throughout the State
- A. piceus* Sand.
On *Liriodendron tulipiferae*
From Painesville, O.
Received from J. G. Sanders
- A. rapax* Comst., greedy scale*
On palm seed, orange and lemon, camellia, greenhouses in New York localities and also
From California
Received from E. M. Ehrhorn
- A. ulmi* Johns.*
On Catalpa, elm
From Buffalo, Le Roy and Albany, N. Y.
- A. uvae* Comst., grape scale*
On grapevine
From Nashville, Tenn.
Through Country Gentleman
- Pseudaonidia duplex* Ckl.*
On orange
From Japan
Via Victoria B. C., from J. R. Anderson
- P. paeoniae* Ckl.*
From Kiushiu, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.
- Chrysomphalus aonidum* Linn.*
In greenhouses through the State, on fern, *Strelitzia regina* and also from Tokio, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.
- C. aurantii* Mask., red scale of California*
From Mozatlan, Mexico
Received from V. L. Kellogg, Leland Stanford University, Cal.
- C. dictyospermi* Morg.*
On *Kentia balmoriana*, fan palm etc.; in greenhouses through the State
- C. kelloggi* Kuw.*
On Chiengogun
From Kiushiu, Japan

- Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.
- C. obscurus* Comst.*
On *Quercus coccinea*
From Columbus, O.
Received from J. G. Sanders
- C. perseae* Comst.
On leaves of *Magnolia grandiflora*
From Florida
- C. rossi* Mask.*
From Lucban, P. I., and also from California
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.
- C. smilacis* Comst.*
On *Smilax*
From Maspeth, N. Y., and New York City
Received from C. E. Olsen
- C. tenebricosus* Comst., gloomy scale*
On maple
From Texas, Mississippi and Virginia
- Xerophilaspis prosopidis* Ckll.*
On *Prosopis velutina*
From Arizona
Received from T. D. A. Cockerell, Las Vegas, N. M.
- Odonaspis bambusarum* Ckll.
On bamboo
From Tokio, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.
- O. schizostachyi* Ckll. & Rob., cotype
On *Schizostachyum*
From Los Banos, P. I.
Received from C. F. Baker, through T. D. A. Cockerell, Boulder,
Col.
- O. secreta* Ckll.*
On bamboo
From Hikosan, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland
Stanford University, Cal.

- Pseudoparlatoria parlatoroides* Comst.
On leaves of *Persea carolinensis*
From Florida
- Aonidia lauri* Bouché*, Bay tree scale*
Through State Department of Agriculture
- Lepidosaphes alba* Ckll.
On *Manihot aipi*
From Florida
Imported from Nassau, N. P.
- L. beckii* Newm., purple scale*
On orange, lemon etc.
From the South, Maspeth and Albany, N. Y.
- L. crawii* Ckll.*
On *Angio laitania-kew*
From S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.
- L. gloverii* Pack., Glovers scale*
On orange
From Kiushiu, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.
- L. newsteadi* Sulc.*
On *Codeasans* sp.
From Tokio, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.
- L. ulmi* Linn., oyster shell scale*
On a great variety of plants; widely distributed throughout the State
- L. uniloba* Kuw.
From Tokio, Japan
Received from S. I. Kuwana
- Ischnaspis longirostris* Sign.
From Yokohama, Japan
Received from S. I. Kuwana, Tokio, Japan
- Parlatoria mytilaspiformis* Green
From Gifu-keu, Japan
Received from S. I. Kuwana, through V. L. Kellogg, Leland Stanford University, Cal.

P. proteus Curt., chaff scale*

On Tangerine, oranges etc.

From the South, New York, Ossining and Maspeth

P. theae Ckll.*

On imported Japanese maple

From Schenectady and Rochester, N. Y.

Received from H. C. Peck and State Department of Agriculture

P. viridis Full.*

On Japanese maples

From Brighton

Through State Department of Agriculture

P. ziziphus Lucas*

On orange

From Satsuma, Japan

Received from S. I. Kuwana, Tokio, Japan

PUBLICATIONS OF THE ENTOMOLOGIST

The following is a list of the principal publications of the Entomologist during the year 1914. The titles¹, time of publication and a summary of the contents of each are given. Volume and page numbers are separated by a colon.

The Gall Midge Fauna of New England. *Psyche*, 20: 133-47, 1913

The list records 137 New England species and presents comparative data relating to our knowledge of this group in various sections. The following new species are described: *Monardia modesta*, *Asynapta nobilis*, *A. frosti*, *Lobodiplosis speciosa*, *Coquillettomyia bryanti*, *Hormomyia shawi*, *H. modesta*, *H. pudica*, *Hyperdiplosis bryanti* and *Itonida reflexa*.

A Rhododendron Borer. *Economic Entomology Journal*, 6: 427, 1913; *Tree Talk*, v. 1, no. 2, p. 19

Records injury to rhododendrons by *Corthylus punctatissimus* Zimm.

The Goldenrod and Its Gall Flies. *Guide to Nature*, 6: 149-51, 1913

A popular, illustrated notice of the gall insects living upon *Solidago* or goldenrod.

Petroleum Compounds or Miscible Oils Unsafe on Sugar Maples.

Tree Talk, v. 1, no. 2, p. 20, 1913

A brief warning notice describing the salient features of this type of injury.

San José Scale. *New York Farmer*, November 13, 1913, page 3

A brief summary of the work of *Prospaltella perniciosi* and *Aphelinus fuscipennis*, with a request for information from localities where this parasite might be abundant.

Adaptation in the Gall Midges. *Canadian Entomologist*, 45: 371-79, pl. 12, 13, 1913; *Entomological Society of Ontario*, 44th Report, p. 76-82, 1913, 1914

A general discussion of biological and structural adaptations in the Itonididae.

San José Scale Parasites. *Catskill Recorder*, November 28, 1913, page 1; *New York Farmer*, December 18, 1913, page 3

Records abundance of a parasite, mostly *Prospaltella perniciosi* Tower, in the Hudson valley and requests specimens.

Two New Canadian Gall Midges. *Canadian Entomologist*, 40: 417-18, December 1913

Cystiphora canadensis reared from a blister leaf gall on *Prenanthes* is described as new, and midges reared from the gall associated with *Cecidomyia helianthi* Brodie are referred to the genus *Hormomyia* and described in detail.

¹ Titles are usually given as published. In some instances articles appearing in a number of papers have been given different titles by the various editors.

Didactylomyia capitata n. sp. Psyche, 20: 174, 1913

Description of a gall midge from North Adams, Mass.

San José Scale Parasites. Tree Talk, v. 1, no. 3, p. 22, February 1914

Observations on the abundance and efficiency of San José scale parasites.

Acaroletes pseudococci n. sp. Economic Entomology Journal, 7: 148-49, 1914

Description of a midge reared from larvae preying on *Pseudococcus citri* in Sicily.

Diadiplosis coccivora n. sp. Entomologist, 47: 86, 1914

Description of a Ceylonese midge reared from a species of *Pseudococcus*

Spraying for Insect Pests. Massachusetts Fruit Growers Association Report, 20th Annual Meeting, 1914, page 89-101

A general discussion of spraying and spraying materials, with special mention of the following insects: San José scale, codling moth, plant lice, pear psylla, pear thrips, and false tarnished plant bug.

House Fly. Knickerbocker Press, March 29, 1914, page 1, magazine section

General, illustrated account of the house fly and methods of control.

Cecidomyiidae by J. J. Kieffer, Fascicle 152 of Genera Insectorum. Entomological News, 25: 185-88, April 1914

A critical review of this work.

Genera Based Upon Erroneously Determined Species. Smithsonian Institution, Publication 2256, page 157, March 1914

A brief discussion of what should be the genotype in cases of evident misidentification, with special reference to the Itonididae.

Early Fruit Pests. New York Farmer, April 30, 1914, page 2

A brief warning notice concerning apple tent caterpillars, codling moth, pear thrips and pear psylla.

Report of the Committee on Entomology. New York State Fruit Growers Association Proceedings, 13th Annual Meeting, 1914, page 22-25

Brief notes on San José scale parasites, pear psylla, pear thrips, red bug, banded grape bug and codling moth.

Insects of the Hudson Valley. New York State Fruit Growers Association Proceedings, 13th Annual Meeting, 1914, page 163-68

A discussion of the efficiency of San José scale parasites, codling moth work, red bugs and plant lice.

Protect the Elms. Castletonian (New York), May 9, 1914, page 3

Summary account advocating thorough spraying of the trees.

Apple Tree Pests. Northern Budget (Troy), May 17, 1914, page 3
Brief warning notice relating to red bugs.

Fly Control. Health News, Monthly Bulletin, New York State
Department of Health, March 1914, page 86-89

Brief, practical summary of the habits of the house fly, with special relation
to its control.

June Beetles. New York Farmer, May 28, 1914, page 4
General warning notice with suggestions for preventing injury.

Caterpillar Control. Troy Budget, June 7, 1914, page 6
Warning notice regarding *Xylina antennata* Walk., with observations
on the value of birds as checks upon caterpillar outbreaks.

Cutworm Warning. Troy Times, June 10, 1914
Directions are given for the control of these pests.

Spraying the Elm Trees. Catskill Recorder, June 12, 1914
Warning notice of probable injury by *Galerucella luteola* Müll.

Fighting Cutworms. New York Farmer, June 18, 1914, page 5
Directions are given for controlling these pests.

Grasshopper Baits. New York Farmer, June 18, 1914, page 5
Several formulas are given for poisoned baits best adapted for grasshopper
control.

Aplonyx sarcobati n. sp. Pomona Journal of Entomology and
Zoology, 6: 93-94, 1914

An undescribed midge, representing a new genus for America and reared from
a leaf gall on *Sarcobates vermiculatus*, is characterized.

Additions to the Gall Midge Fauna of New England. Psyche,
20: 109-114, 1914

The following new species are described: *Monardia lateralis*,
M. multiarticulata, *M. rugosa*, *Porricondyla novae-*
angliae, *P. papillata*, *Lasiopteryx crispata*, *Schizomyia*
speciosa, *Hormomyia proteana* and *Parallelo-*
diplosis cinctipes.

Descriptions of Gall Midges. New York Entomological Society
Journal, 22: 124-34, 1914

The following new species are described: *Colpodia americana*,
C. capitata, *C. ovata*, *C. porrecta*, *C. sylvestris*,
Asynapta apicalis, *A. mediana*, *A. umbra*, *Porricon-*
dyla setosa, *Janetiella parma*, *Toxomyia americana*,
Bremia borealis, *B. tristis*, *B. montana*, *Thomasia*
californica, *Hormomyia saturni*, *Itonida uliginosa*
and the females of *Didactylomyia longimana* Felt and *Kar-*
schomyia viburni Felt.

Cool Weather Aids Aphids. Knickerbocker Press, July 5, 1914

The relation of low temperatures to aphid increase is explained and remedial measures indicated.

Grasshoppers. Post-Standard (Syracuse), July 15, 1914; New York Farmer, July 23, page 4

Summary account of the grasshopper outbreak, advising the use of the Kansas mixture.

The Army Worm. Catskill Recorder, July 31, 1914, page 7; New York Farmer, August 6, 1914, page 1

Brief descriptive account of the army worm with directions for its control.

[Fly Control.] American Journal of Public Health, 6: 621-22, 1914

The necessities of a successful fly campaign are briefly outlined.

Hormomyia bulla n. sp. Canadian Entomologist, 46: 286-87, 1914

The gall on Helianthus and both sexes are described.

Conical Grape Gall, Cecidomyia viticola. Economic Entomology Journal, 7: 339, 1914

Observations are given on the larva and the gall, the former being described.

Gall Midges as Forest Insects. Ottawa Naturalist, 28: 76-79, 1914,

A summary discussion of gall midges as forest insects and the description of *Rhabdophaga swainei* n. sp.

New Gall Midges (Itonididae) Insecutor Inscitiae Menstruus 2: 117-23, 1914

The genus *Konisomyia* is erected and the following new species described: *Tritozyga fenestra*, *Konisomyia fusca*, *Lasioptera tibialis*, *Lobopteromyia venae*, *Dicrodiplosis venitalis* and *Diadiplosis buscki*.

May or June Beetles. New York Farmer, September 17, 1914, page 2

A brief notice of the abundance of June beetles last spring, giving directions for evading the anticipated injury of next season.

Grass and Grubs. New York Farmer, October 15, 1914, page 8

Examination of grasslands for white grubs is advised and directions are given for avoiding serious losses in badly infested mowings.

ADDITIONS TO THE COLLECTIONS, OCTOBER 16, 1913- OCTOBER 15, 1914

The following is a list of the more important additions to the collections.

DONATION

Hymenoptera

- Vespa crabro* Linn., European hornet, adult and work on birch twig, December 16, January 14, Charles Goodyear, Tarrytown. Same, work on white birch, August 26, F. M. Jeffries, New York City. Through State Department of Agriculture
- Isosoma orchidearum* Westw., *Cattleya* or orchid *Isosoma*, infested buds, larvae, pupae and adults on *Cattleya*, July 2, Albert Moore, Mount Kisco
- Aphelinus fuscipennis* How., San José scale parasite, December 5, Vincent Phelps, Newburgh. Same, infesting San José scale on *Symphoricarpos*, December 8, M. C. Albright, Salisbury, Md. Same, on San José scale, December, Frank Kingman, Schodack; Mrs John Budd, Schodack; Dr Edward Masten, Schodack; F. T. Niles, Mamaroneck
- Prosaltella perniciosi* Tower, on San José scale, December, Frank Kingman, Schodack; Mrs John Budd, Schodack; Dr Edward Masten, Schodack; F. T. Niles, Mamaroneck
- Megarhyssa atrata* Linn., black long sting, adult on maple, June 13, W. A. Guernsey, Saratoga Springs
- M. lunator* Fabr., lunate long sting, adult, August 6, Mrs E. J. Bailey, Coeymans
- Rhodites rosifolii* Ckll., lenticular rose gall, on *Rosa blanda*, September 8, Mrs E. P. Gardner, Canandaigua
- R. globuloides* Beutm., globose rose gall, on *Rosa blanda*, September 8, Mrs E. P. Gardner, Canandaigua
- R. dichlocerus* Harr., long rose gall, on *Rosa blanda*, September 8, Mrs E. P. Gardner, Canandaigua
- Aylax pisum* Walsh, galls on *Lygodesmia juncea*, October 15, E. Bethel, Denver, Col.
- Diastrophus fusiformans* Ashm., gall on blackberry, September, S. H. Burnham, Hudson Falls
- D. nebulosus* O. S., adults and galls on blackberry, May 5, J. James de Vyver, Mount Vernon
- Callirhytis cornigera* O. S., gall on *Quercus palustris*, May 20, R. S. Walker, Chattanooga, Tenn.
- C. palustris* O. S., galls, April 30, J. A. Berby and H. L. Parker, Clemson College, S. C.
- C. punctata* Bass., knotty oak gall, adults and galls on *Quercus*, May 5, J. James de Vyver, Mount Vernon
- C. seminator* Harr., wool sower gall, galls on *Quercus*, April 30, J. A. Berby and H. L. Parker, Clemson College, S. C.
- Amphibolips confluentis* Harr., oak apple gall, galls on *Quercus*, April 30, J. A. Berby and H. L. Parker, Clemson College, S. C.

- A. inanis* O. S., empty oak apple, galls on *Quercus*, J. A. Berby and H. L. Parker, Clemson College, S. C.
- Holcaspis globulus* Fitch, bullet gall, galls on *Quercus*, April 30, J. A. Berby and H. L. Parker, Clemson College, S. C.
- Dryophanta echinus* O. S., galls on *Quercus agrifolia*, August 23, E. Bethel, San José, Cal.
- Neuroterus noxiosus* Bass., noxious oak gall, adults and young, on *Quercus*, May 5, J. James de Vyver, Mount Vernon. Same, galls and adult on *Quercus*, July 10, J. W. Sherwood, Spring Valley
- Hylotoma pectoralis* Leach, larvae on white birch, W. C. Rice, Birch Island, Upper Saranac. Through State Conservation Commission
- Pteronus integer* Say, currant stem borer, larvae on currant, August 6, H. J. Carbary, Childwold
- P. ventralis* Say, yellow-spotted willow slug, larvae on willow, August, H. C. Sands, Lynbrook
- Lophyrus abbotii* Leach, Abbott's pine sawfly, larvae on pine, September 30, A. W. Butler, Mount Kisco

Coleoptera

- Dendroctonus terebrans* Oliv., turpentine bark beetle, workings in pine, June 4, G. W. Newman, Waverly
- Phloeosinus dentatus* Say, red cedar bark beetle, larvae and work on red cedar, June 15, J. J. Levison, Brooklyn, also adults and work, September 8
- Xyleborus celsus* Eich., Ambrosia beetle, adult on hickory, May 5, J. James de Vyver, Mount Vernon
- Cryptorhynchus lapathi* Linn., mottled willow and poplar curculio, on poplar, July 11, F. Pomeroy, Cooperstown
- Pomphopoea sayi* Lec., Say's blister beetle, adult, June 8, H. A. Van Fredenberg, Port Jervis. Same, June 13, A. J. Wiltsie, Feura Bush. Same, June 13, C. Seeber, Canajoharie. Same, adults on locust, June 13, Miss Hazel C. Ritter, Little Falls. Same, adults destroying bean blossoms, June 17, J. H. Feily, Rensselaer
- Nyctobates pennsylvanica* De G., adult on hickory, May 5, J. James de Vyver, Mount Vernon
- Bruchus hibisci* Oliv., in seeds of *Hibiscus militaris*, January 13, A. B. Stout, New York City
- Galerucella luteola* Müll., elm leaf beetle, adult, May 11, G. C. Hubbard, Red Hook. Same, May 18, C. C. Marshall, Millbrook. Same, May 25, Mrs Douglas Merritt, Rhinebeck. Same, adults and eggs on elm, June 5, L. A. Tate, Gloversville. Same, eggs and larvae on elm, June 12, M. W. Blackman, Syracuse
- Diabrotica duodecimpunctata* Oliv., 12-spotted *Diabrotica*, September 11, Benjamin Hammond, Illinois
- Gastroidea cyanea* Melsh., adults, May 5, J. James de Vyver, Mount Vernon
- Nodonota puncticollis* Say, adults on rose, June 16, Mrs W. H. Crittenden, Cornwall
- Typophorus canellus* Fabr., strawberry root worm, work on strawberry, August, L. C. Griffith, Lynbrook. Through State Department of Agriculture
- Fidia cana* Horn, adult on grape, May 16, David Hunter, San Antonio, Texas
- Saperda calcarata* Say, poplar borer, larva and work on Lombardy poplar, April 24, M. P. Slade, Mount Kisco

- Graphisurus fasciatus* De G., on hickory, June 22, J. James de Vyver, Mount Vernon
- Hetoemis cinerea* Oliv., on mulberry, June 22, J. James de Vyver, Mount Vernon
- Monohammus confusor* Kirby, sawyer, on balsam, July 20, William Kelly, Blue Mountain Lake
- Elaphidion villosus* Fabr., maple and oak twig pruner, larvae and work on hickory, June 2, A. C. Armstrong, Warner. Same, grubs and work on oak, July 3, F. G. Rosenbaum, New York City. Same, July 7, W. D. Davies, New York City. Same, July 8, A. S. Goodwin, New York City. Same, July 13, H. P. Moore, White Plains. Same, larvae on oak, July 21, H. W. Gordinier & Sons, Troy. Same, July 24, C. K. Carpenter, New York City. Same, July 24, Mrs John T. D. Blackburn, Crater Club, Essex County. Same, July 30, R. D. Chipp, Nyack
- Callidium antennatum* Newm., blue pine borer, on spruce, June 26, Miss Gertrude Lansing, Ogunquit, Me.
- Osmoderma scabra* Beauv., rough flower beetle, larvae at base of decaying oak posts, October 14, J. M. Taylor, Albany
- Ligyris relictus* Say, June, J. James de Vyver, Bronxville
- Lachnosterna arcuata* Sm., June, J. James de Vyver, Bronxville
- L. barda* Horn, June, J. James de Vyver, Bronxville
- L. dubia* Sm., June 10, F. H. Lacy, Boston Corners. Same, adult, June 25, Roy Latham, Orient
- L. fusca* Froh., June beetle, May 19, Gilbert Tucker, Altamont. Same, adult, June 25, Roy Latham, Orient. Same, June, J. James de Vyver, Bronxville
- L. micans* Knoch., May 22, D. T. Marshall, Hollis. Same, June, J. James de Vyver, Bronxville
- L. hirticula* Knoch., June, J. James de Vyver, Bronxville. Same, adult, June 25, Roy Latham, Orient
- L. fraterna* Harr., May 22, D. T. Marshall, Hollis. Same, June, J. James de Vyver, Bronxville. Same, adult, June 19, F. H. Lacy, Boston Corners
- L. crenulata* Froh., June, J. James de Vyver, Bronxville
- L. tristis* Fabr., adult, June 25, Roy Latham, Orient
- L. crassissima* Blanch., *L. implicita* Horn, *L. vehemens* Horn, *L. arcuata* Sm., *L. hirticula* Knoch., *L. gibbosa* Burm., *L. inversa* Horn, *L. bipartita* Horn, *L. congrua* Lec., *L. torta* Lec., *L. affinis* Lec., *L. crenulata* Froh., January 28, J. J. Davis, Lafayette, Ind.
- Diplotaxis tristis* Kirby, May 22, D. T. Marshall, Hollis. Same, June, J. James de Vyver, Bronxville
- Macrodactylus subspinosus* Fabr., rose chafer, adults on peaches, June 16, G. P. Le Brun, Far Rockaway. Same, adults destroying strawberries, June 17, G. M. Tucker jr, Glenmont. Same, adults, June 21, George Sihairer, Scotia
- Serica iricolor* Say, adult on oak, June 3, Samuel Riddell, Huntington
- S. sericea* Ill., adult, June 25, Roy Latham, Orient
- Lyctus planicollis* Lec., powder post beetle, adults on ash, March 12, Hermann Von Schrenk, St Louis, Mo.
- L. opaculus* Lec., powder post beetle, adults, May 23, G. E. Cogswell, Jamaica
- Sitodrepa panicea* Linn., drug store beetle, adult, June 19, H. A. Branion, Chatham
- Chauliognathus pennsylvanicus* De G., adult, September 3, T. L. Cole, Catskill
- Agilus bilineatus* Web., two-lined chestnut borer, work in oak, November 24, J. J. Levison, Brooklyn

- A. otiosus* Say, work on dogwood, March 9, N. C. Peck, Hartsdale
A. anxius Gory, bronze birch borer, work on black birch, September 9, J. J. Levison, Brooklyn
Glischrochilus quadriguttatus Fabr., adults on melon plant, July 20, E. A. Baldwin, Schenectady
Attagenus piceus Oliv., black carpet beetle, adults, May 7, H. N. Armer, Kingston
Staphylinus maculosus Grav., rove beetle, adult, March 6, David Harrison, Staatsburg

Diptera

- Culex subcantans* Felt, adult, July 7, Townsend Cox jr, Setauket
Cecidomyia serotinae O. S., gall on wild cherry, January 19, Fisher's Island. Through State Department of Agriculture
Cecidomyia sp., gall on *Laportea canadensis*, July 6, S. H. Burnham, Hudson Falls
Itonida foliora Rssl. & Hkr., gall on *Quercus*, September, S. H. Burnham, Hudson Falls
Obolodiplosis robiniae Hald., gall on *Robinia*, August 25, Roy Latham, Orient
Arthrocnodax carolina Felt, May 25, E. A. Mac Gregor, Mound, La.
Hormomyia crataegifolia Felt, gall on *Crataegus coloradensis*, July 7, E. Bethel, Denver, Col.
Caryomyia caryae O. S., gall on *Carya*, September, S. H. Burnham, Hudson Falls
? *Contarinia negundifolia* Felt, galls on *Acer negundo*, July 12, A. Cosens, Toronto, Can.
Thecodiplosis pini-radiatae Snow & Mills, galls on *Pinus radiata*, August 23, E. Bethel, Burlingame, Cal. Same, September 18, V. L. Kellogg, Stanford University, Cal.
Cincticornia pilulae Walsh, gall on *Quercus*, September 22, Roy Latham, Orient
Rhopalomyia anthophila O. S., gall on *Solidago*, September 22, Roy Latham, Orient
R. betheliana Ckll., galls on *Artemisia filifolia*, October 15, E. Bethel, Denver, Col.
R. racemicola O. S., gall on *Solidago*, September 22, Roy Latham, Orient
R. solidaginis Lw., gall on *Solidago*, September, S. H. Burnham, Hudson Falls
Sackenomyia viburnifolia Felt, gall on *Viburnum*, September 22, Roy Latham, Orient
Phytophaga rigidae O. S., galls on willow, April 29, A. Cosens, Toronto, Can.
Oligotrophus salicifolius Felt, gall on *Salix humilis*, July 12, A. Cosens, Toronto, Can. Same, gall on willow, September 22, Roy Latham, Orient
Lasioptera corni Felt, gall on *Cornus*, September, S. H. Burnham, Hudson Falls
L. desmodii Felt, gall on Canadian tick trefoil, September 8, Mrs E. P. Gardner, Canandaigua
L. farinosa Beutm., gall on *Rubus*, September 22, Roy Latham, Orient
L. lycopi Felt, gall on *Lycopus*, September 22, Roy Latham, Orient
Neolasioptera clematidis Felt, gall on *Clematis*, September, S. H. Burnham, Hudson Falls
N. erigerontis Felt, gall on *Erigeron*, June 25, Roy Latham, Orient
Cystiphora canadensis Felt, gall on *Prenanthes*, August 25, Roy Latham, Orient

- Dasyneura communis* Felt, galls on maple, June 18, Mrs Charles L. Seeger, Patterson. Same, June 19, S. H. Burnham, Hudson Falls
- D. parthenocissi* Steb., gall on woodbine, June 26, A. E. Stene, Kingston, R. I.
- D. pyri* Bouché, pear leaf-curling midge, adults on pear, November, F. V. Theobald, Wye, Kent, England
- D. rodophaga* Coq., larvae on rose, August 10, C. G. Hewitt, Ottawa, Que.
- Rhabdophaga salicifolia* Felt, gall on hardhack, August 18, W. E. Britton, Essex, Conn. Same, September, S. H. Burnham, Hudson Falls
- Winnertzia hudsonica* Felt, gall on *Crataegus*, September, S. H. Burnham, Hudson Falls
- Agromyza aristata* Malloch & Hart, paratype, May 11, J. R. Malloch, Havana, Ill.
- Eristalis tenax* Linn., drone fly, rat-tail larva from stock well, September 18, Miss Helen E. Bradley, Cato
- Scenopinus fenestralis* Linn., carpet fly, larva under carpet, February 7, Mrs Horace L. Greene, Fort Plain

Lepidoptera

- Papilio troilus* Linn., green-clouded swallowtail, larva on *Benzoin odoriferum*, September 28, C. C. Hodges, Utica
- Eurymus philodice* Godart, adults, September 18, Miss Helen E. Bradley, Cato
- Eu Vanessa antiopa* Linn., spiny elm caterpillar, larvae, June 10, E. T. Brackett, Saratoga Springs. Same, larvae on elm, June 12, Austin Wadsworth, Geneseo. Through State Department of Agriculture. Same, adult, August 11, J. M. Thomas, Yonkers
- Sphecodina abbotii* Swain, Abbott's sphinx, larvae on grape, July 24, D. T. Marshall, Hollis. Same, adult, July 31, A. J. Woodward, Hadley
- Pholus achemon* Dru., larva, July 21, C. M. Briggs, Chicago, Ill. Through J. Eyer
- Paonias myops* Sm. & Abb., adult, June 24, C. H. Peck, Menands
- Halisidota caryae* Harr., adult on maple, August 8, F. J. Whaley, Rensselaerville
- Macronoctua onusta* Grt., larvae on Iris, August 12, Mrs C. H. Van Orden, Catskill
- Agrotis scandens* Riley, climbing cutworm, larvae on corn, June 25, M. R. Audubon, Salem
- Mamestra picta* Harr., zebra caterpillar, larva on Japanese Iris, July 14, G. C. Howard, Garden City. Through Doubleday, Page & Co.
- Heliophila unipuncta* Haw., army worm, larvae on grasses, July 18, D. T. Marshall, Hollis. Same, adult, September 2, Howard Travell, New York City
- Xylina antennata* Walk., green fruit worm, adults, March 31, April 1 and April 18, E. B. Jausen, Kingston. Same, June 5, L. A. Tate, Gloversville. Same, larvae on elm, June 12, Austin Wadsworth, Geneseo. Through State Department of Agriculture
- Heliethis armiger* Hüb., cutworm, larvae on corn, July 30, A. T. Ogden, Kinderhook. Same, larva and work on corn, October 29, F. J. Ganong, Crafts. Same, larvae on corn, August 12, R. D. Chipp, Nyack
- Abrostola triplasia* Linn., dark spectacle, pupa on Magnolia, March 20, P. L. Husted, Blauvelt. Through M. M. Kennedy
- Alabama argillacea* Hüb., cotton moth, adults, September 25 and October 20, M. S. Baxter, Rochester. Same, adults, September 25, C. C. Laney, Rochester

- Datana integerrima* Grt. & Rob., black walnut caterpillar, exuviae on black walnut, August 24, T. J. Wade, New Rochelle
- Euproctis chrysorrhoea* Linn., brown-tail moth, winter nests, January 2, Fisher's Island. Through State Department of Agriculture
- Malacosoma americana* Fabr., apple tent caterpillar, eggs on apple, January 31, S. B. Van Patten, Union. Same, March 4, E. Lyon, Katonah. Same, larvae, May 5, Leonard Barron, Garden City. Same, larvae and tent, May 18, J. O. Van Clefe, Oakdale, L. I. Same, adult, June 5, L. A. Tate, Gloversville. Same, cocoon, July 15, W. S. Lodge, Chilson Lake. Same, egg masses, August 31, J. J. Hicks, Jericho
- M. disstria* Hüb., forest tent caterpillar, larvae, May 28, Miss Eliza S. Blunt, New Russia. Same, larvae on elm, June 12, Austin Wadsworth, Geneseo. Through State Department of Agriculture. Same, adults, June 16, J. W. Nichols, Saratoga Springs. Same, cocoon on pine, June 17, J. E. Riley. Through State Conservation Commission. Same, cocoons and cast skins, June 18, Beekman Winthrop, New York City. Same, cocoons and old egg belts, June 20, Miss Eliza S. Blunt, New Russia. Same, larvae and cocoons, July 1, J. L. Leavitt, Russell. Same, larvae and cocoons, July 3, Frank Owens, Horicon. Same, larvae, July 4, John Janack, jr, Wanakena. Same, cocoons, July 7, F. S. Witherbee, Port Henry. Same, July 7, Michael Ahearn, Clayburgh. Same, cocoons, July 15, C. A. Phelps, Canton. Same, exuviae on sugar maple, September 8, Mrs C. McClellan Smith, Cambridge
- Paleacrita vernata* Peck, spring canker worm, June 7, C. L. Morey, Greenwich. Same, work, June 22, J. James de Vyver, Mount Vernon
- Eustroma diversilineata* Hüb., larvae on woodbine, June, H. H. Horner, Albany
- Erannis tiliaria* Harr., 10-lined inch worm, June 7, C. L. Morey, Greenwich
- Cingilia catenaria* Dru., September 22, Roy Latham, Orient
- Thyridopteryx ephemeraeformis* Haw., bagworm, bag on apple, March 26, J. H. Dodge, Nebraska. Same, on *Styrax*, August 4 and 12, Millers Nursery, South Jamaica. Through State Department of Agriculture
- Sibine stimulea* Clem., saddle-back caterpillar, larva on oak, October 16, Miss Margaret George, Yonkers
- Prolimacodes scapha* Harr., Skiff Limacodes, larvae on flowering crabapple, October 6, L. C. Griffith, Lynbrook. Through State Department of Agriculture
- Zeuzera pyrina* Linn., leopard moth on apple, December 16, Charles Goodyear, Tarrytown. Same, work on linden, September 11, C. E. Mager, New York City
- Prionoxystus robiniae* Peck, larva, July 20, R. W. Braucher, Western Maryland
- Podosesia syringae* Harr., ash borer, adult, larvae and exuviae on ash, October 5, F. J. Seaver, New York City
- Phlyctaenia ferrugalis* Hüb., greenhouse leaf-tyer, adults on Chrysanthemum, December 2, C. H. Zimmer, Lynbrook. Through State Department of Agriculture. Same, larva on Marsh field fern, June 19, S. H. Burnham, Hudson Falls
- Crambus caliginosellus* Clem., sooty Crambus, larvae on corn, June 12, F. H. Lacy, Millerton. Same, larva, June 24, H. W. Pulver, Pine Plains. Same, larvae on corn, July 6, E. W. Conklin, Salt Point
- Dioryctria reniculella* Grote, spruce cone worm, larvae in spruce cones, July 8, S. J. Clark, Mount Vernon

- Tmetocera ocellana* Schiff., bud moth on cherry buds, April 8, J. H. Livingston, Tivoli
- Archips cerasivorana* Fitch, ugly nest cherry worm, larvae, July 7, W. H. Bradford, Ellenville. Same, adults, July 7, A. S. Callan, Chatham
- A. fervidana* Clem., larvae on oak, July 14, Alfred Waterman, Twaddell Point Station, East Branch
- Tortrix fumiferana* Clem., spruce bud worm, pupae on spruce, June 1, S. G. Harris, Tarrytown. Same, larvae on spruce, June 3, Mrs E. C. Whiting, Schenectady. Same, larvae on blue spruce, June 4, W. G. Stoneman, Albany. Same, pupae in hemlock and balsam, June 25, Miss Edith M. Patch, Orono, Me. Same, larvae on spruce, July 7, Robert Parmelee, Oswegatchie
- Dichomeris marginellus* Fabr., Juniper webworm, cocoon and work on Swedish Juniper, December 15, Isaac Hicks & Son, Westbury. Same, larva on Juniper, April 11, H. W. Merkel, New York City
- Coleophora limosipennella* Dup., elm case-bearer, larvae on elm, June 22, J. James de Vyver, Mount Vernon. Same, July 22, G. M. Kurz, Oyster Bay
- C. fletcherella* Fern., cigar case-bearer, larvae on apple, June 22, J. James de Vyver, Mount Vernon

Platyptera

- Corydalis cornuta* Linn., Dobson fly, larvae, June 3, Irving Van Bergen, Schoharie. Same, adult, June 26, Mrs H. C. Morehouse, Howes Cave

Ephemeridae

- Baetisca obesa* Say, larvae May 24, C. F. Alexander, Northampton
- Cleon* sp., larvae from water supply, December 8, Theodore Horton, Albany
- Siphonisca aerodromia* Ndh., Mayfly, larvae, May 24, C. F. Alexander, Northampton

Hemiptera

- Cicada linnei* Grossb., August 16, J. F. Rose, South Byron.
- ? *Ormenis pruinosa* Say, lightning leaf hopper, young on wild cherry, July 14, C. Bahnsen, Lake Placid
- Aphrophora parallela* Say, parallel spittle insect, nymphs on pine, July 3, J. H. Smith, Chestertown
- Bythoscopus franciscanus* Baker, June 21, E. P. Van Duzee, La Jolla, Cal.
- Thamnotettix heidemanni* Ball., June 21, E. P. Van Duzee, La Jolla, Cal.
- Alebra albostriella* Fall., on Norway maple, July 16, C. C. Lawrence, Newburg. Through Frost & Bartlett Co.
- Pachypsylla venusta* O. S., gall on *Celtis reticulata*, December 1, E. Bethel, Denver, Col.
- Phylloxera caryaecaulis* Fitch, hickory gall aphid, gall, June 23, Miss A. K. Hays, South Nyack. Same, July 2, Stamford, Conn. Through Frost & Bartlett Co.
- Chermes floccus* Patch on spruce, December 16, Mrs Openhyme, St Huberts. Through State Department of Agriculture
- C. abietis* Linn., spruce gall aphid on spruce, January 14, Charles Goodyear, Tarrytown. Same, galls on spruce, August 6, Arthur Dummert, Mount Vernon. Same, on spruce, September 2, G. L. Barrus, Lake Placid Club, Essex Co.

- C. strobilobius* Kalt., woolly larch aphid, eggs on pine, May 4, Walter Luke, New York City. Same, eggs and young on larch, May 5, A. J. Seaver, New York City
- C. cooleyi* Gill., aphid spruce gall, gall on spruce, July 7, John Nill, Watertown
- C. pinicorticis* Fitch, pine bark aphid, adults and young on white pine, May 3, A. G. Foord, Kerhonkson
- Pemphigus populi-globuli* Fitch, galls on Lombardy poplar, June 18, T. J. Wade, New Rochelle
- Colopha ulmicola* Fitch, cockscomb elm gall, galls on elm, July 1, Edwin Lyon, Katonah
- Schizoneura lanigera* Hausm., woolly aphid on elm leaves, June 5, L. A. Tate, Gloversville. Same, June 9, J. H. Livingston, Tivoli. Same, June 10, J. D. Judson, Vernon. Same, adults and young on elm leaves, June 20, Miss Eliza S. Blunt, New Russia. Same, June 22, Miss Alice C. Hereford, Watertown. Same, adult on slippery elm, June 23, W. W. Howell, Poughkeepsie. Same, July 5, Mrs Horace L. Greene, Fort Plain
- Phyllaphis fagi* Linn., woolly beech leaf aphid, adults and young on beech, September 19, Naramore & Young, Rochester
- Chaitophorus aceris* Linn., Norway maple plant louse, adults on Norway maple, July 9, Miss Emily F. Becker, Catskill
- Drepanosiphum acerifolii* Thos., on maple, May 25, M. J. Naramore, Ossining
- Mindarus abietinus* Koch., balsam aphid, work on balsam, July 7, John Nill, Watertown
- Aphis sorbi* Kalt., rosy aphid, adult and young, July 2, J. R. Heilman, Poughkeepsie
- Myzus cerasi* Linn., black cherry aphid, adult on cherry, June 23, W. W. Howell, Poughkeepsie
- Paraleyrodes mori* Quaint., adults on Kalmia, July 3, H. W. Niles, Mount Kisco
- Kermes pubescens* Bogue, on white oak, May 14, G. B. King, Lawrence, Mass.
- K. cockerelli* Ehrh., on *Quercus kelloggii*, May 14, G. B. King, Lawrence, Mass.
- K. nivalis* King & Ckll., on *Quercus rubra*, May 14, G. B. King, Lawrence, Mass.
- K. essigii* King, on *Quercus agrifolia*, May 14, G. B. King, Lawrence, Mass.
- Physokermes piceae* Schr., spruce bud scale, adults and young on Norway spruce, July 7, F. S. Witherbee, Port Henry. Same, galls on spruce, August 6, Arthur Dummett, Mount Vernon
- Pseudococcus ledi* Ckll., scale on *Ledum groenlandicum*, August, H. D. House, near Oneida, Madison county
- Pulvinaria vitis* Linn., cottony maple scale, adult on grape, May 9, E. Bunn, Yonkers. Same, egg sacks on maple, July 14, Alfred Waterman, Twaddell Point Station, East Branch
- Gossyparia spuria* Mod., elm bark louse on elm, December 16, Charles Goodyear, Tarrytown. Same, female on elm, June 18, F. L. Mead, Mechanicville. Same, on elm, July 22, G. M. Kurz, Oyster Bay
- Phenacoccus acericola* King, false maple scale, young on sugar maple, April 24, J. D. Turner, Kingston. Same, adults on sugar maple, September 2, Benjamin Hammond, Fishkill
- Phenacaspis mischocarpi* Ckll. & Rob., on *Mischocarpus*, June 24, T. D. A. Cockerell, Los Banos, P. I.
- Protopulvinaria longivalvata bakeri* Ckll., June 24, T. D. A. Cockerell, Los Banos, P. I.

- Eulecanium nigrofasciatum* Perg., black-banded scale, young scales on Sycamore, December 30, J. J. Levison, Brooklyn. Same, young on sugar maple, November 19, New York Farmer, Port Jervis
- E. tarsale* Sign., soft scale on dogwood, December 16, Charles Goodyear, Tarrytown
- E. tulipiferae* Cook, tulip tree scale, adults on tulip tree, July 30, J. H. Livingston, Tivoli
- Neolecanium sallei* Sign., Lecanium scale, adult on *Erythrina* sp., February, Dr W. M. Wheeler, San Lucas Toliman, Guatemala
- Icerya purchasi* Mask., cottony cushion scale, adults and young on Acacia, October 23, L. C. Griffith, Lynbrook
- Chionaspis americana* Johns., scurfy elm scale, eggs on elm, October 17, J. J. Levison, Brooklyn. Same, eggs on *Ulmus americana*, November 7, Hicks Nurseries, Westbury. Same, on elm, December 16, Charles Goodyear, Tarrytown. Same, June 2, D. Kraisman, Brooklyn. Same, young on elm, July 8, F. J. Whaley, Albany
- C. furfura* Fitch, scurfy scale on pear, December 16, Charles Goodyear, Tarrytown. Same, eggs on apple, March 26, F. H. Lacy, Poughkeepsie. Same, eggs on pear, April 20, James Fulton, Hayworth, Ill. Through Benjamin Hammond, Fishkill
- C. corni* Cooley, on Cornus, December 5, Isaac Hicks & Son, Westbury
- C. euonymi* Comst., Euonymus scale, on shrubs and vines, December 16, Charles Goodyear, Tarrytown. Same, adults and young, on *Euonymus radicans*, February 24, J. C. MacGregor, Mount Kisco. Through State Department of Agriculture. Same, on *Euonymus* and *Celastrus*, January 14, Charles Goodyear, Tarrytown
- C. pinifoliae* Fitch, pine leaf scale, eggs on pine, April 16, H. W. Merkel, New York City. Same, eggs on *Pinus cembra*, May 2, S. G. Harris, Tarrytown
- Hemichionaspis uvariae* Ckll. & Rob., on Uvaria, June 24, T. D. A. Cockerell, Los Banos, P. I.
- Diaspis carueli* Targ., Juniper scale, adults on *Juniperus virginiana*, November 7, Hicks Nurseries, Westbury. Same, adult on red cedar, March 16, J. J. Levison, Brooklyn. Same, eggs on cedar, April 16, H. W. Merkel, New York City
- Aulacaspis rosae* Sandberg, rose scale on rose, December 19, H. W. Gordinier & Sons, Troy
- Odonaspis schizostachyi* Ckll. & Rob., on *Schizostachyum*, June 24, T. D. A. Cockerell, Los Banos, P. I.
- Aspidiotus abietis* Schr., hemlock scale on hemlock, January 14, Charles Goodyear, Tarrytown. Same, eggs on hemlock, April 16, H. W. Merkel, New York City
- A. ancylus* Putn., Putnam scale, adults on linden, July 8, F. J. Whaley, Albany
- A. hederæ* Vall., white scale, adults on Cattleya, July 2, Mount Kisco. Through Albert Moore
- A. perniciosus* Comst., San José scale on weeping cherry, December 16, Charles Goodyear, Tarrytown
- A. rapax* Comst., greedy scale, adult on Baytree, November 11. Through State Department of Agriculture
- Lepidosaphes ulmi* Linn., oyster shell scale, eggs on apple, April 8, Mrs W. E. Kerin, Troy. Through H. W. Gordinier. Same, eggs on lilac, May 11, Miss M. L. McMaster, Greenwich. Same, eggs and young, June 26, C. P. Cassidy, Poultney, Vt.

Chlorochroa uhleri Stal. Juniper plant bug, adults on corn, September 11, Miss M. S. Soule, Quaker Street, also nymphs and adults, August 23
Euschistus variolarius Pal. Beauv., adults, August 23, Miss M. S. Soule, Quaker Street
Arilus cristatus Linn., wheel bug, eggs, December 22, Maryland. Through State Department of Agriculture
Paracalocoris scrupeus Say, nymphs, June 3, L. F. Strickland, Lockport
Neurocolpus nubilus Say, adult on sumac, July 7, L. F. Strickland, Lockport
Lygidea mendax Reut., false red bug, work on apple, June 12, C. R. Shons, Washingtonville. Same, on apple, June 19, E. S. Gregory, Niverville. Same, work on apple leaves, June 22, J. James de Vyver, Mount Vernon. Same, work, July 2, J. R. Heilman, Poughkeepsie. Same, July 6, C. H. Duell & Son, Bangall. Same, July 8, F. H. Lacy, Poughkeepsie, also adults, July 10, Hyde Park

Orthoptera

Melanoplus femoratus Burm., two-striped grasshopper, adult, September 29, Miss May C. Bradley, Cato
M. femur-rubrum DeG., red-legged grasshopper, adult, September 29, Miss May C. Bradley, Cato
Encotolophus sordidus Burm., sordid grasshopper, adult, September 29, Miss May C. Bradley, Cato

Thysanura

Lepisma domestica Pack., silver-fish or slide, adult, March 25, D. H. Cox, New York City
Lipura ambulans Linn., in greenhouse soil, February 5, William Harris, Saratoga Springs

PURCHASE

Kny-Scheerer Company, New York City

Lepidoptera (butterflies and moths)

Ornithoptera zalmoxis, Africa
O. hekuba, pair, North Australia
Papilio blumei, Celebes
Teniopalpus imperialis, female, Assam
Papilio rhodifer, Andaman Islands
P. agenor, Assam
Morpho anaxibia, Brazil
Attacus atlas, male, Sumatra
Brahmea whitei, female, Canton
Thysania agrippina, Brazil
Geometrid, showing protective coloration, India
Erebus odora, Cuba
Ophideres aurantia, Queensland
Ornithoptera rhadamanthus, pair, India
Morpho sulkowskyi, Columbia
Stichophthalma camadera, India
Thaumantis diores, India

Papilio majo, Andaman Islands
Eploe vestigiata, India
Bunnaea cafferaria, Kamerun
Hyperchiria janus, pair, Mexico
Epiphora banhinia, female, Africa
Nudaurelia ringleri, Africa
Gynanisa maja, Natal
Phyllodes sp., India
Graellsia isabellae, pair, Europe
Ornithoptera lydius, pair
Morpho polyphemus, Mexico
Ornithoptera urvilleana, pair

Coleoptera (beetles)

Catoxantha opulenta, India
Mormolyce phyllodes, India
Odontolabis lowei, Borneo
Calosoma sycophanta, Germany
Chrysina macropus, male, Mexico
Chrysaspis speciosa var. *fastuosa*
Chiasognathus granti, male, South America
Ateuchus sacer, North Africa
Entimus imperialis, Brazil
Lamprina aurata
Plusiotus resplendens, Chiriqui
Xyllorhiza adusta, India
Goliathus regius, Africa
Euchirus longimanus, Australia
Dynastes neptum
Goliathus giganteus, male, Kamerun
Lithinus nigrocristatus and lichen on which the beetle lives, Madagascar
Batocera ulma, pair
B. armata, pair
Megosoma elephas, male, Central America
Golofa porteri, pair, Venezuela
Euchroma gigantea, Panama
Dictyophorus reticulatus, Florida

Orthoptera (grasshoppers, walking sticks, etc.)

Giant cockroach, Amazon River
Phyllium siccifolium
Phryganistria fruehstorferi, Assam
Temera imperialis, Tonkin
Timanthes brunni, Tonkin
 Giant grasshoppers
Gryllotalpa sp., Porto Rico

Riker mounts and life histories

Asta, large honey bee
 Smaller, red wood ant
Trochilium apiformis
Arctia caja
Coccinella septempunctata
Dissosteira carolina
Periplaneta americana
Murgantia histrionica
Neoclytus erythrocephalus
Pelidnota punctata
Alsophila pometaria
Agrotis ypsilon
Melittia satyriniformis
Noctua c-nigrum
Bombus terricola
Cimbex americana

EXCHANGE

There were received from Prof. S. I. Kuwana of the board of plant inspection, Imperial Ministry of Agriculture and Commerce, Tokio, Japan, specimens of the following Coccidae.

Aspidiotus bambusarum Ckll., *A. cryptomeriae* Kuw., *A. paeoniae* Ckll., *A. secreta* Ckll., *Chionaspis bambusae* Ckll., *C. citri* Comst., *C. hikosani* Kuw., *C. kiushiuensis* Kuw., *Lepidosaphes crawii* Ckll., *L. uniloba* Kuw., *Parlatoria ziziphus* Lucas, *Ischnaspis longirostria* Sign., *Leucaspis japonica* Ckll., *Pulvinaria citricola* Kuw., *P. hazae* Kuw., *P. horii* Kuw., *P. idesiae* Kuw., *P. oyamae* Kuw., *P. photiniae* Kuw., *Lecanium glandi* Kuw., *L. kunoensis* Kuw., *L. nishigaharae* Kuw., *Aclerda tokionis* Ckll., *Lecanodiaspis quercus* Ckll., *Ericerus pela* West., *Eriococcus lagerstroemiae* Kuw., *Antonina crawi* Ckll., *Kermes vastus* Kuw., *Takahashia japonica* Ckll., *Icerya okodae* Kuw. equals *I. seychellarum* West.

The Tasmanian Coleoptera listed below were received January 5th, through G. H. Hardy, secretary of the Tasmanian Museum and Botanical Gardens.

Prynus scutellaris Fabr.
Paropsis lineata Marsh.
P. serpigiosa Er.
P. nigerrima Germ.
Xanthophaea angustula Chd.
Trigonothrops longiplaga Chd.
Adelium abbreviatum L.

Sarothrocrepis callida
Angonocheila curtula Er.
Natalis porcata Fabr.
Euchoptera apicalis Saund.
Lagria grandis Gyllh.
Haltica pagana Bl.

From C. W. Johnson, Boston, Mass., a series of 83 species determined by this well-known authority on two-winged flies, and comprising a notable addition to the State collection. The numerals preceding the names indicate the number of specimens.

- | | |
|--|---|
| 4 Odontomyia microstoma <i>Lw.</i> | 4 Hypocharassus pruinus <i>Whlr.</i> |
| 4 Beris annulifera <i>Bigot.</i> | 4 Hydrophorus aestuum <i>Lw.</i> |
| 1 Scoliopelta luteipes <i>Will.</i> | 4 H. intentus <i>Aldrich</i> |
| 2 Geosargus elegans <i>Lw.</i> | 4 H. chrysologus <i>Walk.</i> |
| 4 Hermetia illucens <i>Linn.</i> | 2 Dichaetoneura leucoptera <i>Johns.</i> |
| 4 Oxycera unifasciata <i>Lw.</i> | 2 Hypostena dunningii <i>Coq.</i> |
| 4 Nemotelus canadensis <i>Lw.</i> | 4 H. floridensis <i>Town.</i> |
| 4 N. unicolor <i>Lw.</i> | 2 Leskia analis <i>Say</i> |
| 2 Chrysops sackeni <i>Hine</i> | 4 Exorista vulgaris <i>Fall.</i> |
| 2 C. delicatulus <i>O. S.</i> | 2 Sturmia inquinata <i>Vdw.</i> |
| 2 C. montanus <i>O. S.</i> | 2 Masicera festinans <i>Meign.</i> |
| 2 C. pudicus <i>O. S.</i> | 2 Tachina simulans <i>Meign.</i> |
| 2 C. fallax <i>O. S.</i> | 4 Gonia senilis <i>Will.</i> |
| 4 C. obsoletus <i>O. S.</i> | 4 Epigrymyia floridensis <i>Town.</i> |
| 4 Platypalpus flavirostris <i>Lw.</i> | 4 Panzeria ruficauda <i>Brauer</i> |
| 4 P. aequalis <i>Lw.</i> | 4 P. radicans <i>Fall.</i> |
| 4 Drapetis spectabilis <i>Melander</i> | 2 Peleteria aenea <i>Staeg.</i> |
| 4 Chersodromia houghi <i>Melander</i>
(Coloboneura) | 4 Melanophora roralis <i>Linn.</i> |
| 4 Coloboneura inusitata <i>Melander</i> | 4 Tetramerinx unica <i>Stein.</i> |
| 2 Litanomyia elongata <i>Melander</i> | 4 Phyllogaster cordyluroides <i>Stein.</i> |
| 2 Hemerodromia scapularis <i>Lw.</i> | 4 Spilogaster pagana <i>Fabr.</i> |
| 4 Clinocera simplex <i>Lw.</i> | 4 S. urbana <i>Meign.</i> |
| 3 Syneches rufus <i>Lw.</i> | 4 Linnophora diaphana <i>Weid.</i> |
| 2 Empis distans <i>Lw.</i> | 4 Fucillia marina <i>Macq.</i>
(fucorum of authors not Fall.) |
| 2 E. humilis <i>Lw.</i> | 4 Rivellia quadrifasciata <i>Macq.</i> |
| 2 E. tridentata <i>Coq.</i> | 4 Seoptera vibrans <i>Linn.</i> |
| 2 E. loripedis <i>Coq.</i> | 2 Acidia fausta <i>O. S.</i> |
| 2 E. obesa <i>Lw.</i> | 2 Diastata vagans <i>Lw.</i> |
| 4 E. spectabilis <i>Lw.</i> | 2 Scyphella flava <i>Linn.</i> |
| 2 Hilara tristis <i>Lw.</i> | 4 Milichiella arcuata <i>Lw.</i> |
| 4 H. umbrosa <i>Lw.</i> | 4 Pholeomyia indecora <i>Lw.</i> |
| 2 Oreogeton obscura <i>Lw.</i> | 4 Agromyza posticata <i>Meign.</i>
(A. terminalis <i>Coq.</i> is a synonym,
according to Malloch) |
| 4 Rhamphomyia candicans <i>Lw.</i> | 2 A. parvicornis <i>Lw.</i> |
| 2 R. irregularis <i>Lw.</i> | 2 A. melampyga <i>Lw.</i> |
| 2 R. luteiventris <i>Lw.</i> | 2 Dryomyza aristalis <i>Coq.</i> |
| 2 R. mutabilis <i>Lw.</i> | 2 Tetanocera setosa <i>Coq.</i> |
| 2 R. glabra <i>Lw.</i> | 3 Clusia lateralis <i>Walk.</i> |
| 4 R. umbilicata <i>Lw.</i> | 2 C. czernyi <i>Johns.</i> |
| 4 R. gracilis <i>Lw.</i> | 2 Bittacomorpha jonesi <i>Johns.</i> |
| 4 R. pulla <i>Lw.</i> | |
| 4 Dolichopus palaesticus <i>Lw.</i> | |
| 2 Pelastoneura cognatus <i>Lw.</i> | |
| 2 Gymnopternus laevigatus <i>Lw.</i> | |
| 4 Argyra calcitrans <i>Lw.</i> | |

APPENDIX

A STUDY OF GALL MIDGES III

PORRICONDYLARIAE

The members of this tribe of the Itonididae may be recognized by the possession of a distinct crossvein in connection with the first tarsal segment being shorter than the second. The crossvein is so characteristic of the group that a little experience suffices to separate members from all other Itonididae except in the case of a few anomalous forms. This crossvein usually runs parallel to costa, or nearly so, though in *Colpodia* and its close allies the crossvein may be at a considerable angle to costa. This latter is also true, but in a different manner, in *Winnertzia*. *Diallactes* Kieff. is remarkable



Fig. 1 *Winnertzia pectinata*; lateral view of adult, enlarged (original)

for the possession of a rudimentary branch near the basal third of subcosta. The third vein in this group extends well beyond the apex before fusing with costa, except in *Winnertzia*. The very slender, linear wings of *Colpodia* are unique in the family. The antennae exhibit great diversity of structure, presenting, as do other organs, types of extreme development. The stem of the flagellate segments in some males has a length three times that of the basal enlargement. The setae are extremely long and in some forms present an arrangement not far removed from the characteristic crenulate whorls found in *Campylomyza*. The circumfili are more aberrant than in any tribe aside from the *Itonididinae*. These organs are frequently set at a considerable distance from the face of the segment, in this respect approaching *Schizomyia*, and display a marked tendency toward distal prolongation. This is particularly well marked in *Winnertzia* with its minute horseshoelike structures, nails and all, on opposite faces of the segments. The claws may be simple or unidentate and in some species are distinctly swollen subapically. The male genitalia present most striking diversities. The terminal clasp segment may be obese as in some species of *Porricondyla*, greatly dilated subapically as in *P. hamata*, or very greatly produced and slender as in *Didactylomyia*. The ovipositor in the female is frequently short, with the terminal lobes biarticulate, or the ovipositor may be extensile and with the biarticulate lobes subapical and dorsal as in *Winnertzia*.

Little is known of the life history of our American forms and there is such great diversity between the two sexes that the present classification must be regarded as largely preliminary. Most of the species presumably live in dead or decaying vegetable matter.

Key to genera

- a* Crossvein not parallel with costa, forming a well-marked angle therewith
- b* Four long veins, the fifth simple, the sixth free
 - c* Fifth vein arising from the third near the crossvein, a supernumerary vein at the basal third of subcosta.....*Diallactes* Kieff.
 - cc* Fifth vein arising from the base of the wing, no supernumerary vein at the basal third of subcosta
 - d* Fifth vein well developed; circumfili modified to form horseshoelike appendages on opposite faces of the segment
Winnertzia Rond. (Syn. *Winnertziola* Kieff.)
 - dd* Fifth vein rudimentary, obsolete basally and apically (Australian)
Gonioclema Skuse¹
- bb* Three long veins, the sixth a branch of the fifth or wanting
- c* Wings not very long and narrow, the crossvein at an oblique angle to costa

¹ Location provisional.

- d* Fifth vein forked, the sixth a branch of the fifth
 - e* Fifth vein close to the posterior margin and uniting therewith near the basal half; palpi triarticulate; terminal clasp segment short
Bryocrypta Kieff.
 - ee* Fifth vein not close to the posterior margin, uniting therewith near the distal fourth; palpi quadriarticulate
 - f* No supernumerary vein at base of subcosta; claws toothed; terminal clasp segment greatly produced, slender
Didactylomyia Felt
 - ff* Supernumerary vein at base of subcosta; claws simple
Liebeliola Kieff. & Jorg.
- dd* Fifth vein simple, the sixth wanting
 - e* Palpi quadriarticulate.....*Johnsonomyia* Felt¹
 - ee* Palpi biarticulate.....*Colomyia* Kieff.
- cc* Wings usually very long, narrow, the crossvein almost at right angles to costa
 - d* Fifth vein forked, the sixth a branch of the fifth; terminal clasp segment short, swollen, the claws usually simple.....*Colpodia* Winn.
 - dd* Fifth vein simple, not reaching the wing margin.....
Clinophaena Kieff.
 - ddd* Fifth vein simple, the sixth wanting (fossil).....
Paleocolpodia Meun.
- aa* Crossvein parallel or nearly so with costa and apparently a continuation of the third vein
 - b* Four long veins, the fifth simple, the sixth free
 - c* Fifth vein not obsolete basally
 - d* Distal portion of the abdomen not recurved dorsally
 - e* Pulvilli longer than the unidentate claws; 16 or more antennal segments; ovipositor biarticulate.....*Asynapta* H. Lw.
 - ee* Pulvilli shorter than the simple claws; 14 antennal segments; ovipositor triarticulate.....*Clinorhysis* Kieff.
 - dd* Abdomen slender, the distal portion recurved dorsally; claws toothed, the lobes of the ovipositor biarticulate...*Ruebsaamenia* Kieff.
 - cc* Fifth vein obsolete basally; abdomen greatly produced, at least three times the length of the remainder of the body....*Dicerura* Kieff.
- bb* Three long veins, the sixth a branch of the fifth or wanting
 - c* Fifth vein forked
 - d* Circumfili of the male not forming long loops or bows as in the Itonidinae
 - e* Palpi quadriarticulate
 - f* Antennal segments of the male greatly produced, or at least with a distinct stem

¹ The absence of circumfili compels the reference of this genus to the Heteropezinae, though the superficial wing and antennal structures would place it here. It has therefore been included in the key simply to facilitate identification.

- g* Abdomen not recurved dorsally... *Porricondyla* Rond.¹
gg Abdomen slender, recurved dorsally... *Campatomyia* Kieff.
ff Antennae not greatly produced in both sexes
g Basal clasp segment ovate, denticulate apically; terminal clasp segment wanting... *Dirhiza* H. Lw.
gg Male genitalia presumably normal; flagellate antennal segments subsessile or nearly so; lobes of the ovipositor normal... *Prodirhiza* Kieff.
ee Palpi triarticulate... *Lopezziella* Tav.
dd Circumfili of the male forming long loops as in the Itonidinae... *Lopesia* Tav.
ee Palpi unarticulate... *Alloclipsis* Kieff. & Jorg.
cc Fifth vein simple, the sixth wanting
d Claws denticulate, as long as the pulvilli or at most twice as long as the pulvilli... *Holoneurus* Kieff.
dd Claws toothed, more than twice the length of the pulvilli... *Coccopsis* Meij.

WINNERTZIA Rond.

Clinorhiza Kieff.*Winnertziola* Kieff.

- 1860 **Rondani, C.** Atti Soc. Ital. Sci. Nat. Milano, 2:5, 8
 1876 **Bergensamm, J. E. & Low, Paul.** Syn. Cecidomyidarum, p. 24
 1892 **Theobald, F. V.** Acct. Brit. Flies, 1:84
 1894 **Kieffer, J. J.** Soc. Ent. Fr. Ann., 63:313, 340 (*Clinorhiza* and *Winnertzia*)
 1896 ———— Berl. Ent. Zeitschr., 41:3, 4, 7, 33

¹ The divisions given below are those of Kieffer, which for the present at least, we prefer not to apply to American forms.

h Claws simple*i* Pulvilli as long or a little shorter than the claws

j Flagellate antennal segments of the male globose, elongated and constricted in the middle in the female... *Porricondyla* Rond.

jj Flagellate antennal segments elongated and subcylindrical in the two sexes... *Phaenepidosia* Kieff.

ii Pulvilli rudimentary

j Flagellate antennal segments of the female with a stem one-half to three-fourths the length of the enlargement; lobes of ovipositor biarticulate... *Parepidosis* Kieff.

jj Flagellate antennal segments of the female sessile; lobes of the ovipositor very small... *Mysocosmus* Kieff.

hh Claws toothed*i* Pulvilli as long as the claws

j Terminal clasp segment as long as the basal clasp segment, capitate apically... *Dicroneurus* Kieff.

jj Terminal clasp segment ellipsoidal, shorter than the basal clasp segment... *Synaptella* Kieff.

ii Pulvilli reaching at most to the middle of the claws

j Third and fourth antennal segments fused... *Synarthrella* Kieff.

jj Third and fourth antennal segments not fused; terminal clasp segment a little longer than its diameter, almost truncate, the margin spined... *Prosepidosis* Kieff.

1897	Kieffer, J. J.	Syn. Cecid. de Eur. & Alg., p. 47
1900	—————	Soc. Ent. Fr. Ann., 69:447
1904	Meunier, F.	Soc. Sci. Brux. Ann., 28:8
1908	Felt, E. P.	N. Y. State Mus. Bul. 124:421
1911	—————	N. Y. Ent. Soc. Jour., 19:39
1913	Kieffer, J. J.	Marcellia, 11:235 (Winnertziola)
1913	—————	Gen. Insect., fasc. 152, p. 281

The peculiar venation serves at once to distinguish members of this genus. The third vein is united to subcosta by a distinct, oblique crossvein and joins the margin at or near the apex, rarely or never beyond. The fifth and sixth veins are distinct, simple. There are 13 or 14 antennal segments, sessile in the female and with an evident stem in the male. Most peculiar of all, the flagellate segments are ornamented in both sexes with very highly developed

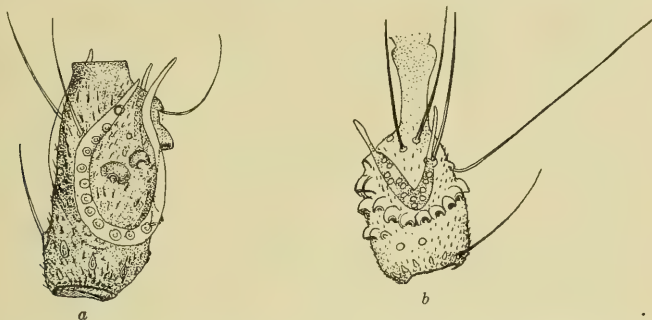


Fig. 2 *Winnertzia calciequina*; *a*, sixth antennal segment of female showing "horseshoe" circumfili; *b*, ninth antennal segment of male, opposite aspect from that shown in fig. 4; enlarged (original)

and peculiar circumfili. The latter resemble minute horseshoes, nails and all, fastened to opposite sides of the segment. These organs occur nearer the base of the segment in the female than in the male. The palpi are quadriarticulate, the claws toothed and the pulvilli short or rudimentary. The male genitalia have the terminal clasp segment short, stout, with a distinct apical tooth and the basal clasp segment very broad and stout. The dorsal and ventral plates are also stout. There are a series of distinct thickenings or chitinous rods (plate 5, figure 4) which give the genitalia of this genus a very characteristic appearance. The ovipositor is long, stout and with bi- or triarticulate lobes usually attached to the dorsal angle. Type *Asynapta lugubris* Winn. There is a good series of fine females (no males) in the Winnertz collection at the University of Bonn. Our American forms are evidently cogeneric.

Winnertziola Kieff. is placed as a synonym of *Winnertzia* Rond. since the differential characters do not appear to be constant in American species.

Key to species

a 13 antennal segments

- b Fifth antennal segment with a stem three-fourths the length of the basal enlargement. Abdomen yellowish brown; length 1 mm; male.....

carpini Felt, C. 106

- bb Fifth antennal segment with a stem one-fifth the length of the basal enlargement. Abdomen greenish yellow; length 2 mm; female.....

palustris n. sp., C. 1357

aa 14 antennal segments

- b Segments sessile or subsessile; females

- c Abdomen reddish brown; length 2 mm, the fifth antennal segment with a length one-half greater than its diameter, the fourth palpal segment one-half longer than the third.....

arizonensis Felt, C. 1022

- cc Abdomen greenish yellow; length 2 mm, the fifth antennal segment with a length two and one-half times its diameter, the fourth palpal segment nearly twice the length of the third.....

calciequina Felt, C. 673

- ccc Abdomen fuscous yellowish; length 1.5 mm; fifth antennal segment with a length two and one-half times its diameter, the fourth palpal segment one-half longer than the third; reared from decaying chestnut bark.....

pectinata Felt, C. a2109

- cccc Abdomen fuscous yellowish, length 2mm, fifth antennal segment with a length two and one-half times its diameter, fourth palpal segment with a length twice that of the third. Reared from decaying sugar maple bark.....

aceris Felt, C. a2381

- ccccc Abdomen pale straw, length 2 mm, fifth antennal segment with a length twice its diameter, the fourth palpal segment one-half longer than the third.....

karnensis Felt, C. 395

- ccccc Abdomen fuscous yellowish, length 1.5 mm, fifth antennal segment with a length two and one-half times its diameter, the fourth palpal segment twice as long as the third.....

hudsonici Felt, C. a1555y

- bb Fifth antennal segment with a stem one-third the length of the basal enlargement; males

- c Abdomen dark yellowish brown, length 1.5 mm, the fourth palpal segment twice the length of the third.....

ampelophila Felt, C. 450

- cc Abdomen dark brown, length .75 mm, the fourth palpal segment twice the length of the third.....

solidaginis Felt, C. 508

- bbb Fifth antennal segment with a stem three-fourths the length of the basal enlargement; males

- c Abdomen yellowish green basally, apically light brown, length 2 mm; fourth palpal segment one-half longer than the third.....

calciequina Felt, C. 561

- cc Abdomen fuscous yellowish, length 1.75 mm; the fourth palpal segment one-half longer than the third; reared from decaying chestnut bark....

pectinata Felt, C. a2109

- ccc Abdomen fuscous yellowish, length 2 mm, fourth palpal segment nearly twice the length of the third. Reared from decaying maple bark.....aceris Felt, C. 22381
- cccc Abdomen dull brown, length 1.25 mm; fourth palpal segment one-fourth longer than the third.....rubida Felt, C. 300
- bbbb Fifth antennal segment with a stem as long as the basal enlargement; male
- c Abdomen dark brown, length 1 mm; fourth palpal segment twice the length of the third.....pinicorticis Felt, C. 1047

Winnertzia carpini Felt

- 1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 148-49 (separate, p. 52)
- 1908 ——— N. Y. State Mus. Bul. 124, p. 421

The midge was taken on ironwood, *Carpinus caroliniana*, at Albany, N. Y., June 1, 1906.

Male. Length 1 mm. Antennae as long as the body, thickly haired, dark brown; 13 segments, the fifth with a stem three-fourths the cylindric basal enlargement, which latter has a length twice its diameter; terminal segment with a length four times its diameter, composed of two closely fused. Palpi; the first segment with a length four times its diameter, the second twice as long, stout, the third a little longer, more slender, the fourth one-half longer than the third. Mesonotum yellowish brown, the submedian lines yellow-haired. Scutellum yellowish with a few setae apically, postscutellum darker. Abdomen yellowish brown, the basal segment and genitalia darker. Wings hyaline, costa dark brown. Halteres, coxae and femora yellowish transparent, the last slightly fuscous apically; tibiae and tarsi pale yellowish brown; claws stout, curved, unidentate, the pulvilli shorter than the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment short, obese; dorsal and ventral plates broad, slightly emarginate, the lobes obliquely truncate. Type Cecid. 106.

Winnertzia palustris n. sp.

This species was taken July 10, 1909 on low vegetation at Canada Lake, town of Caroga, N. Y., by Mr C. P. Alexander.

Female. Length 2 mm. Antennae about two-thirds the length of the abdomen, thickly haired, dark brown; 13 segments, the fifth with a stem one-fifth the length of the cylindric basal enlargement, which latter has a length three times its diameter; terminal segment reduced, with a length three times its diameter, tapering to a narrowly rounded apex. Palpi; the first segment short, subquadrate, the second stout, with a length three times its diameter, the third one-half longer, more slender, the fourth one-half longer and more slender than the third. Mesonotum dull brown. Scutellum dark brown, sparsely haired, postscutellum probably dark brown. Abdomen greenish yellowish, the ovipositor fuscous. Wings hyaline, costa dark brown. Halteres yellowish transparent. Legs mostly pale

yellowish or fuscous yellowish, the tarsi mostly dark brown; claws minutely unidentate, rather long, slender, evenly curved, the pulvilli rudimentary. Ovipositor stout, about two-thirds the length of the abdomen when extended, the terminal lobes triarticulate, the third tapering to a narrowly rounded apex. Type Cecid. 1357.

Winnertzia arizonensis Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 421

Described from a female taken June 12th at Williams, Ariz., by H. S. Barber.

Female. Length 2 mm. Antennae probably extending to the base of the abdomen, thickly haired, fuscous yellowish, probably 14 segments, the fifth subcylindric, with a length about one-half greater than its diameter. Palpi; the first segment short, stout, irregular, the second rather stout, with a length about three times its diameter, the third one-fourth longer and more slender and the fourth one-half longer and more slender than the third. Mesonotum, scutellum and abdomen a dull reddish brown. Wings narrow, hyaline, costa pale straw. Legs yellowish brown; claws long, stout, strongly curved, unidentate, the pulvilli shorter than the claws. Ovipositor longer than the body, the terminal lobes biarticulate, the second segment more slender, with a length about twice its diameter, broadly rounded apically. Type Cecid. 1022.

Winnertzia hudsonici Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 422

This species was reared at Albany, N. Y., July 25, 1907 from a jar containing leaves of a *Crataegus* bearing greenish, stout, cup-shaped, fimbriate galls (N. Y. State Mus. Bul. 175, pl. 3, fig. 16), each inhabited by one larva. The species presumably came from decaying vegetable matter.

Female. Length 1.5 mm. Antennae extending to the fourth abdominal segment, rather thickly haired, dark straw, pale yellowish basally; 14 segments, the fifth subcylindric, subsessile, with a length twice its diameter; terminal segment somewhat produced, tapering distally to a subacute apex. Palpi; the first segment long, slender, the second a little longer, stouter, slightly swollen subapically, the third one-half longer and more slender than the second, the fourth about twice the length of the third, more slender; face pale yellowish. Mesonotum dark brown, the submedian lines pale yellowish. Scutellum, postscutellum and abdomen a nearly uniform fuscous yellowish, the latter sparsely haired, ovipositor dark brown. Wings hyaline, costa light brown. Halteres pale yellowish, fuscous subapically. Coxae, femora and tibiae mostly light fuscous yellowish, tarsi mostly dark brown; claws short, stout, slightly curved, the pulvilli shorter than the claws. Ovipositor as long as the body, with a long, slender, biarticulate lobe, the second segment with a length three times its diameter. Type Cecid. ar555y.

Winnertzia ampelophila Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 144 (separate, p. 48)
(*Porricondyla*)

1908 ——— N. Y. State Mus. Bul. 124, p. 422

The midge was taken at Albany, N. Y., on Virginia creeper, *Psedera quinquefolia*, July 3, 1906. The wing is illustrated on plate 4, fig. 11.

Male. Length 1.5 mm. Antennae a little shorter than the body; sparsely haired, dark brown, fuscous yellowish basally; 14 segments, the fifth with a stem one-third the length of the cylindric basal enlargement, which latter has a length twice its diameter; the two

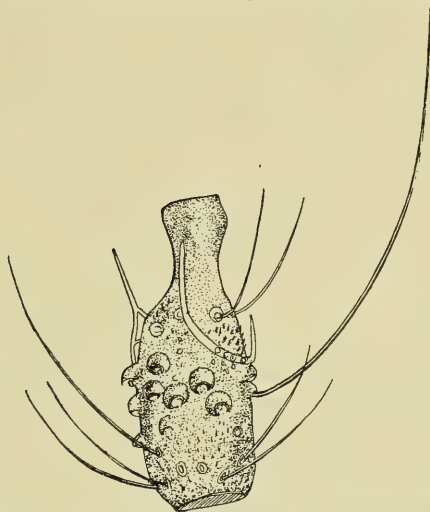


Fig. 3 *Winnertzia ampelophila*; sixth antennal segment of male, enlarged (original)

distal segments rather closely fused, both with the basal portion slightly produced and no distal stem. Palpi; the first segment short, subquadrate, the second more than twice its length, slightly dilated near the middle, the third a little longer, more slender, the fourth about twice the length of the third, more slender. Face fuscous yellowish. Mesonotum nearly uniform dark brown. Scutellum dark reddish brown, postscutellum dark brown. Abdomen dark yellowish brown with yellowish on the dorsum of the fourth segment, sparsely clothed with dark hairs. Wings subhyaline, costa dark brown. Halteres yellowish transparent. Legs pale fuscous yellowish, tarsi slightly darker; claws short, stout, slightly curved. Genitalia; basal clasp segment short, very broad, truncate; terminal clasp segment short, very stout, the internal distal angle with a long, stout, spine. Dorsal plate apparently very broad, slightly emarginate; ventral plate long, broad, deeply and narrowly emarginate, the lobes narrowly rounded; style long, slender. Type *Cecid.* 450.

Winnertzia solidaginis Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 149 (separate, p. 53)

1908 ——— N. Y. State Mus. Bul. 124, p. 422

The male was taken in general collecting on goldenrod, solidago, and aster at Albany, N. Y., July 6, 1906.

Male. Length .75 mm. Antennae probably as long as the body, sparsely haired, dark brown; probably 14 segments, the fifth with a stem one-third the length of the cylindric basal enlargement, which latter has a length twice its diameter. Palpi; first segment short, subquadrate, the second subrectangular, with a length twice the first, the third one-half longer, stouter, the fourth nearly twice the length of the third, slender. Mesonotum dark brown, the submedian lines sparsely haired. Scutellum fuscous brown, yellowish apically, postscutellum and abdomen dark brown. Wings hyaline, costa light brown. Halteres pale yellowish. Legs pale yellowish, the tarsi variably tinged with orange. Genitalia; basal clasp segment long, stout; terminal clasp segment stout, with a length thrice its diameter. (Plate 5, figure 4). Type Cecid. 508.

Winnertzia karnerensis Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 422

This species was taken on hard pine, *Pinus rigidae*, at Karner, N. Y., June 26, 1906. The wing is figured on plate 4, fig. 10.

Female. Length 2 mm. Antennae extending to the base of the abdomen, sparsely haired, dark brown; 14 segments, the fifth with a length twice its diameter; the 13th and 14th partially fused, the latter slightly produced, subconic. Palpi; the first segment long, irregular, the second twice the length of the first, rectangular, the third a little longer, slender, the fourth longer and more slender than the third. Mesonotum dark brown with scattering, pale setae. Scutellum and postscutellum fuscous. Abdomen pale straw. Wings hyaline, costa dark brown. Halteres slightly fuscous. Legs with the coxae and femora brown; tibiae a little darker, tarsi gray; claws stout, slightly curved; the pulvilli shorter than the claws. Ovipositor probably nearly as long as the body, slender; terminal lobes slender, probably biarticulate, narrowly rounded. Type Cecid. 395.

Winnertzia aceris Felt

1913 Felt, E. P. N. Y. Ent. Soc. Jour. 21:213-14

The white larvae of this species occur singly or in small groups under the thin, decaying bark of sugar maple. The adults are closely allied to both *W. calciequina* Felt and *W. pectinata* Felt. The male of the former has heavy circumfili extending to the basal fourth of the enlargement, while in this species the basal portion of the circumfili reaches only to the distal third of the enlargement as in *W. pectinata*. The chitinization of these structures is much weaker than in the last named species, the basal enlargement is more globose and cylindric and there are differences in the genitalia. Detailed descriptions are given in the above citation.

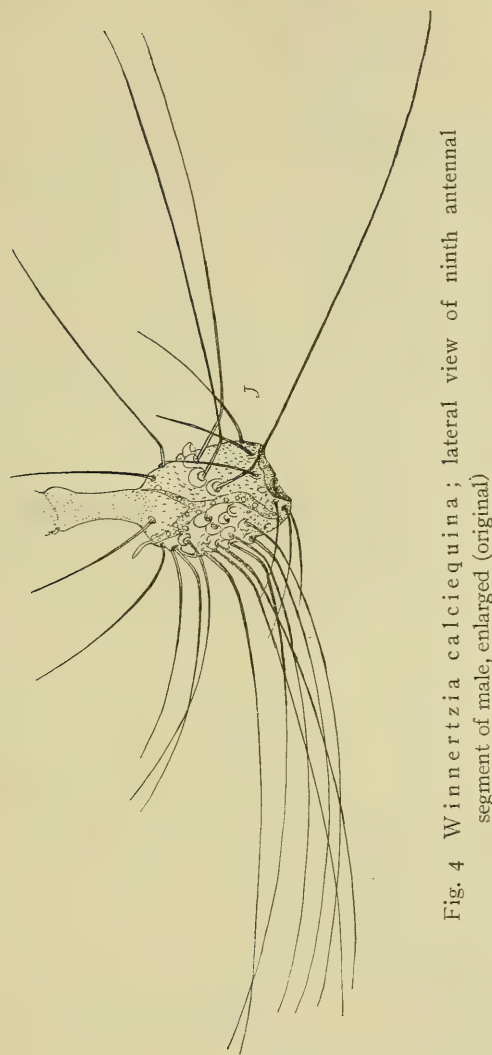


Fig. 4 *Winnertzia calciequina*; lateral view of ninth antennal segment of male, enlarged (original)

Winnertzia calciequina Felt1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 161

1908 ————— N. Y. State Mus. Bul. 124, p. 421

Described from insects taken on pine, probably *Pinus strobus*, at Albany, N. Y., July 24, 1906.

Male. Length 2 mm. Antennae a little shorter than the body, thickly haired, dark brown, yellowish basally; 14 segments, the fifth with a stem three-fourths the length of the subcylindric basal enlargement, which latter has a length twice its diameter; terminal segment somewhat reduced, narrowly rounded apically. Palpi; the first segment short, subquadrate, the second greatly produced, slightly swollen distally, perhaps composed of two fused, the third about one-half the length of the preceding, more slender than the distal portion, the fourth one-half longer than the third, slightly more dilated. Face greenish yellow. Mesonotum dark brown, sparsely clothed with fine, silvery hairs; scutellum and postscutellum dark brown. Abdomen yellowish green basally, the apical segments light brown. Wings hyaline, costa dark brown. Halteres whitish transparent. Coxae, femora and tibiae mostly pale yellowish, tarsi nearly uniform fuscous; claws stout and strongly curved; the pulvilli very short. Genitalia; basal clasp segment very stout, broad, obliquely truncate; terminal clasp segment short, stout, broadly rounded and with a conspicuous, slender spine. Dorsal plate long, broad, slightly emarginate. Ventral plate long, broad, broadly rounded; style rather long, stout, broadly rounded.

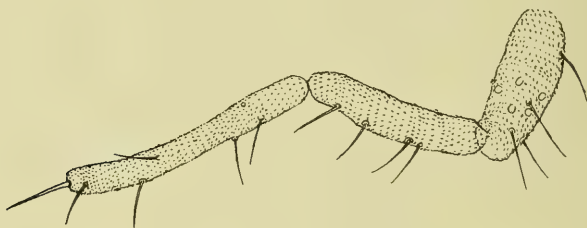


Fig. 5 *Winnertzia calciequina*; female palpus, enlarged (original)

Female. Length 2 mm. Antennae extending to the second abdominal segment, sparsely haired, dark brown; 14 segments, the

fifth subsessile, subcylindric, with the length two and one-half times greater than the diameter; (figure 2); terminal segment

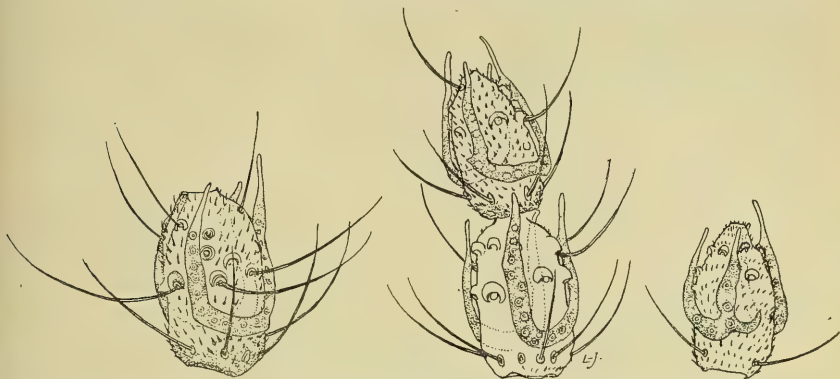


Fig. 6 *Winnertzia calciequina*, female; *a*, 11th antennal segment; *b*, distal two antennal segments of the right antenna; *c*, distal antennal segment; enlarged (original)

slightly reduced, narrowly rounded distally. Palpi; the first segment short, subquadrate, the second a little stouter, longer, the third one-half longer than the second, more slender, the fourth nearly twice as long as the third and more slender. Eyes large, black. Mesonotum olive brown, submedian lines indistinct. Scutellum



Fig. 7 *Winnertzia calciequina*; lateral view of claw and tip of last tarsal segment of female, enlarged (original)

fuscous greenish, postscutellum dark brown. Abdomen greenish yellowish, ovipositor dark brown, sparsely clothed with fine fuscous

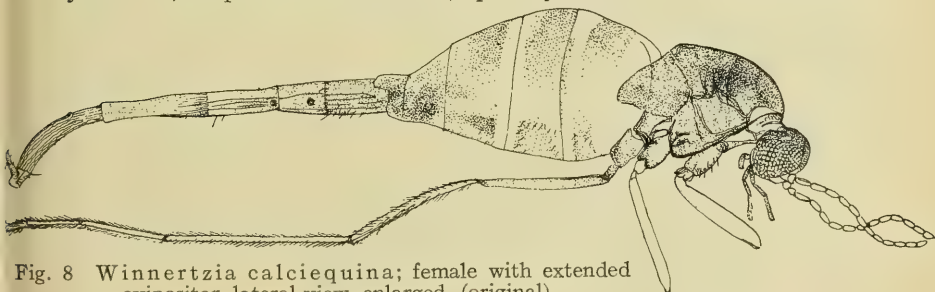


Fig. 8 *Winnertzia calciequina*; female with extended ovipositor, lateral view, enlarged, (original)

hairs. Wings narrow, subhyaline, costa dark brown. Halteres slightly fuscous basally, white apically. Legs mostly a light fuscous yellowish distally, tarsal segments dark brown; claws stout, strongly curved; pulvilli very short. Ovipositor nearly as long as the body, stout, the terminal lobes biarticulate, the terminal segment long, broad, subquadrate. (figure 9). Type Cecid. 561.

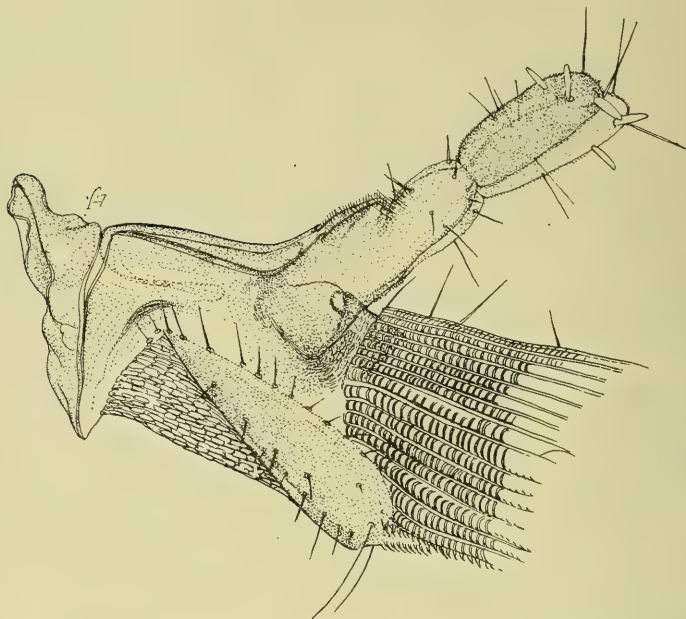


Fig. 9 *Winnertzia calciequina*; tip of female ovipositor, enlarged (original)

Winnertzia pectinata Felt

1911 Felt, E. P. Econ. Ent. Jour. 4:478

Larvae of this species were found November 24, 1910 in partly decayed chestnut bark at Nassau, N. Y. There were also many similar appearing, though very different larvae, *Medeterus*, which apparently preyed upon these midge larvae and became relatively more abundant in the spring. Adult midges were reared from April 26th to the last of May or in early June. The insect is evidently allied to *W. calciequina* Felt, from which it is most easily separated by the stouter antennal segments, color differences and the longer, stouter terminal clasp segment. Larvae collected in the field April 11th remained alive and under constant observation till May 15th, the fly being found June 5th. The larvae show no sign of a breastbone in the fall and early spring.

Larva. Length 4 mm; white. Head long, tapering, narrowly rounded apically. Antennae stout, with a length fully three times the diameter. Body moderately stout, the skin finely ridged longitudinally, the posterior extremity distinctly bilobed, each lobe with a conical, chitinous process apically. Shortly before transformation a distinct, lance-shaped, dark brown breastbone may be observed. The ocular spot is largely obscured by adjacent tissue.

For a description of the male, see the citation above.

Female. Length 1.5 mm. Antennae extending to the base of the abdomen, thickly haired, fuscous yellowish; 13 subsessile segments, the fifth subcylindric, with a length two and one-half times its diameter, a sparse subbasal whorl of short setae and a scattering subapical band of long, slender setae, terminal segment produced, with a length fully three times its diameter and tapering slightly to a narrowly rounded apex. Face fuscous yellowish. Palpi lighter, the first segment subquadrate, with a length nearly three times its diameter, the second stouter, one-half longer, the third a little longer than the second, more dilated, the fourth one-half longer than the third. Mesonotum fuscous yellowish, the submedian lines sparsely haired. Scutellum fuscous yellowish, postscutellum a little lighter. Abdomen fuscous yellowish, the stout ovipositor mostly fuscous, yellowish apically. Halteres fuscous yellowish, fuscous subapically. Coxae fuscous yellowish; femora basally a whitish transparent, the distal portion of femora, tibiae and tarsi a light fuscous straw; claws stout; the pulvilli rudimentary. Ovipositor with a length greater than the body; terminal lobes irregular, with a length about three times the greatest width, indistinctly triarticulate. Type Cecid. a2109.

Winnertzia rubida Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 422

The male was swept from syringa at Albany, N. Y., June 15, 1906.

Male. Length 1.25 mm. Antennae as long as the body, thickly haired, yellowish brown; 14 segments, the fifth with a stem three-fourths the length of the cylindric basal enlargement, which latter has a length one-half greater than its diameter; terminal segment reduced, conic, with a length three times its diameter. Palpi; first segment cylindric, with a length three times its diameter, the second a little longer, stouter, the third one-half longer, more slender and the fourth a little longer and more slender. Mesonotum dull black, the submedian lines sparsely haired. Scutellum fuscous, yellowish apically, postscutellum and abdomen dull brown, the latter sparsely clothed with fuscous hairs. Wings hyaline, costa fuscous yellowish. Halteres yellowish fuscous. Legs a nearly uniform yellowish; claws stout, strongly curved; the pulvilli rudimentary. Genitalia; basal clasp segment stout; terminal clasp segment stout, dorsal plate broad, broadly and roundly emarginate, ventral plate short, broad deeply emarginate. Type Cecid. 300.

Winnertzia pinicorticis Felt

1907 Felt, E. P. New Species of Cecidomyiidae II, p. 23

1908 ———— N. Y. State Mus. Bul. 124, p. 304, 422

1909 ———— Ent. Soc. Ont. 39th Rep't, p. 46

This species was reared by Mr Pergande from under the bark of *Pinus virginiana* February 5 and 16, 1892 and taken by Mr Farley at Strom, Va.

Male. Length 1 mm. Antennae as long as the body, thickly haired, fuscous yellowish; 14 segments, the fifth with a stem as long as the subcylindric basal enlargement, which latter has a length fully one-half greater than its diameter; terminal segment produced, broadly rounded apically. Palpi; the first segment with a length more than twice its diameter, slightly expanded apically, the second as long as the first, much stouter, the third one-third longer than the second, more slender, the fourth nearly twice the length of the third and more slender. Mesonotum dark brown, scatteringly clothed with yellowish setae, the submedian lines indistinct. Scutellum reddish brown, postscutellum a little darker, abdomen dark brown. Wings hyaline, costa light brown. Halteres pale yellowish. Legs a nearly uniform fuscous yellowish. Genitalia; basal clasp segment short, stout, obliquely truncate; terminal clasp segment short, stout, greatly swollen, apically with two long, slender spines and minor teeth; dorsal plate broad, long, slightly emarginate, the lobes broadly rounded; ventral plate short, broad, deeply and narrowly emarginate. Type Cecid. 1047.

DIDACTYLOMYIA Felt

1911 Felt, E. P. N. Y. Ent. Soc. Jour., 19:39

1913 Kieffer, J. J. Gen. Insect, fasc. 152, p. 263

This remarkable genus is easily separated from *Colpodia* to which it was provisionally referred, by the slightly broader wings, the fifth vein not being close to the posterior margin, and especially by the peculiar genitalia, both the basal and terminal clasp segments being greatly produced, the latter with a length fully seven times its diameter. The claws are unidentate. Females provisionally referred to this genus have 14 subsessile cylindric antennal segments and a short ovipositor, the lobes biarticulate. Type *Colpodia longimana* Felt.

Didactylomyia longimana Felt1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 416 (*Colpodia*)

1914 N. Y. Ent. Soc. Jour. 22:127

Described from a striking male taken at Auburndale, Mass., August 16, 1906 by Prof. C. W. Johnson. Both sexes were collected by C. P. Alexander in August 1909 at Woodworth's lake at an altitude of about 1500 feet. The female has been described, see the second citation.

Male. Length 1.5 mm. Antennae longer than the body, sparsely haired, light brown, yellowish basally, 15 segments, the fifth with a stem, slightly enlarged distally, fully one-fourth longer than the cylindric basal enlargement, which latter has a sparse subbasal

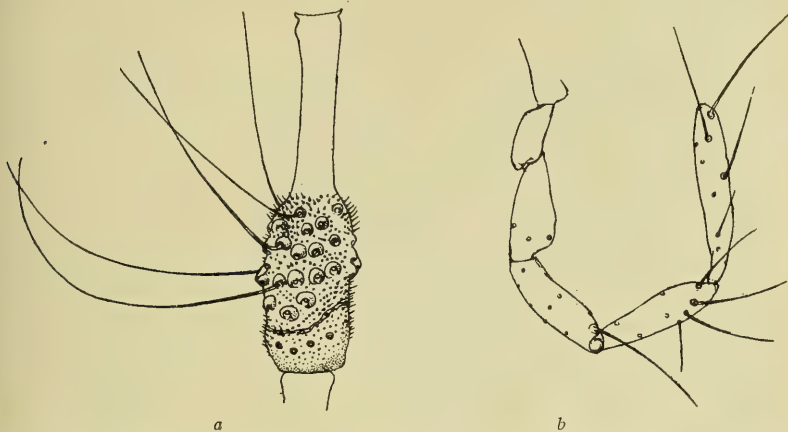


Fig. 10 *Didactylomyia longimana*, male; *a*, 5th antennal segment, the obscure distal circumfilum not being represented in the illustration; *b*, male palpus, enlarged, (original)

whorl of short, stout, slightly curved setae, a broad subapical band of long, slender, curved setae. Irregular, slightly elevated circumfili occur near the basal third and apically. Mouth parts produced, with a length about one-half the transverse diameter of the head. Palpi; the first segment long, the second one-fourth longer than the first, more slender, the third as long as the second, fusiform, the fourth one-fourth longer than the third, more slender. Face yellowish. Mesonotum pale yellowish orange, the submedian lines yellowish, indistinct. Scutellum whitish, postscutellum pale orange. Abdomen pale yellowish orange. Genitalia pale orange. Wings hyaline, costa pale brown. Halteres yellowish basally, whitish apically. Legs a variable fuscous yellowish, the tarsi light brown; claws long, slender, strongly curved, a long, slender, curved tooth basally, the pulvilli nearly as long as the claws. Genitalia; basal clasp segment slender, a small, triangular lobe at the internal basal angle; terminal clasp segment very slender, strongly curved near the basal fourth; dorsal plate short, broad, deeply and triangularly incised, the lobes irregularly rounded; ventral plate broad, broadly and roundly emarginate, the lobes short, well separated; style short, stout, tapering, obtusely rounded. Plate 5, figure 5. Type Cecid. 830.

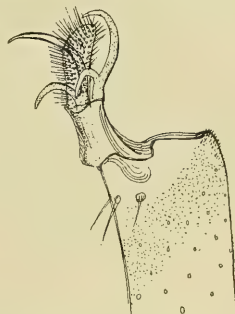


Fig. 11 *Didactylomyia longimana*. Lateral view of claw and tip of last tarsal segment, enlarged, (original)

***Didactylomyia maculata* n. sp.**

This pale orange species was taken in a trap lantern at Poughkeepsie, N. Y., June 28, 1906. The same species or a closely allied form was also taken in a trap lantern at Newport, N. Y., July 11, 1906.

Female. Length 1 mm. Antennae about two-thirds the length of the body, sparsely haired, slaty brown, yellowish basally; 14 segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length thrice its diameter; terminal segment produced, with a length fully four times its diameter and a long, slender, slightly capitate process apically. Palpi; first segment rectangular, with a length four times its diameter, the second a little longer than the first, the third about as long as the second, the fourth one-half longer than the third. Face orange yellow, the mouth parts produced, with a length fully half the width of the head. Mesonotum a light orange yellow. Scutellum pale yellowish, postscutellum and abdomen pale orange yellowish, slightly darker basally and apically. Wings whitish, subhyaline, slightly fuscous at the apical fourth, there being an oval spot just behind costa and another on the third vein; costa yellowish, the crossvein joining subcosta near its basal half, the latter uniting with costa at the basal third, the third vein well beyond the apex. Halteres pale yellowish. Coxae pale yellowish, the anterior and mid legs a nearly

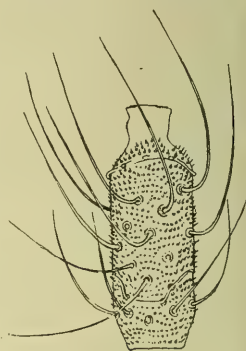


Fig. 12 *Didactylomyia maculata*. Fifth antennal segment of female, enlarged



Fig. 13 *Didactylomyia maculata*. Female palpus, enlarged, (original)

uniform brownish black, the posterior legs with the tibiae and tarsi pale yellowish, annulate with fuscous distally; tarsi brownish black; claws slender, evenly curved; the pulvilli nearly as long as the claws. Ovipositor short, the lobes biarticulate, the distal segment narrowly oval. Type Cécid. 415.

***Didactylomyia capitata* Felt**

1913 Felt, E. P. Psyche, 20:174

The peculiar male was taken by Mr Owen Bryant in August 1907, either at North Adams, Mass., or on Greylock mountain. It is closely allied to *D. longimana* Felt.

***Didactylomyia flava* n. sp.**

The yellowish midge was taken on dogwood, *Cornus*, at Albany, N. Y., July 6, 1906.

Female. Length 1.66 mm. Antennae about two-thirds the length of the body, sparsely haired, dark brown, yellowish basally; 14 segments, the fifth with a stem about one-fifth the length of the cylindric basal enlargement, which latter has a length fully three times its diameter. Palpi; the first and second segments probably short, rectangular, the third with a length three times its diameter, the fourth only a little longer than the third, equally stout. The produced face pale yellowish. Thorax and abdomen a nearly uniform bright yellowish, except for a dark, oval spot at the base of the latter. Costa light yellowish, the slender though distinct crossvein at the distal third of subcosta, which latter joins costa at the basal third, the third vein uniting with the margin well beyond the apex. Coxae pale yellowish, the posterior femora and tibiae yellowish straw, the tarsi and other legs mostly dark fuscous; claws slender, evenly curved; the pulvilli nearly as long as the claws. Ovipositor short, the terminal lobes biarticulate, the terminal segment narrowly and irregularly oval, minor lobes short, stout, setose. Type *Cecid.* 520.

LIEBELIOLA Kieff. & Jörg.

1910 **Kieffer, J. J. and Jörgensen, P.** Centrbl. Bakt. Parsit. Insektk. 27:428-29

This Argentine genus is provisionally referred to the Porricondylariae, it being easily separated from *Didactylomyia* Felt by the presence of a supernumerary vein at the base of subcosta, and the simple claws. Antennae of the female with 14 segments, the third fused with the fourth, the fifth subcylindric, with a length three times its diameter, scarcely constricted and with a stem twice as long as thick. Palpi quadriarticulate. Mouth parts one-third as long as the head. Supernumerary vein extends to the middle of subcosta, which latter unites with costa near the middle of the wing and is joined to the third vein by a very oblique crossvein; the fifth vein joins the posterior margin near the distal third, its very short branch a little before the basal half. The simple fuscous claws are twice as long as the pulvilli. Ovipositor slightly produced, the lamellae short, elliptical and thickly haired. This insect winters in a subglobose, stem gall on *Prosopis strombulifera*. Type *L. prosopidis* Kieff & Jörg.

COLPODIA Winn.

- 1853 **Winnertz, J. W.** Linn. Ent., 8:293-94
- 1862 **Osten Sacken, C. R.** Dipt. N. Am., 1:176
- 1863 **Schiner, J. R.** Fauna Austriaca Dipt., 2:401
- 1876 **Bergensstamm, J. E. & Low, Paul,** Syn. Cecidomyidarum, p. 23
- 1877 **Karsch, F. A. F.** Revis. de Gallmucken, p. 16

- 1888 **Skuse, F. A. A.** Linn. Soc. N. S. Wales Proc., 3:39, 43, 114
 1896 **Kieffer, J. J.** Berl. Ent. Zeit., 41:10
 1897 ——— Syn. Cecid. de Eur. & Alg., p. 43
 1900 ——— Soc. Ent. Fr. Ann., 69:447
 1904 **Meunier, F.** Soc. Sci. Brux. Ann., 28:8
 1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 415
 1911 ——— N. Y. Ent. Soc. Jour. 19:40
 1913 **Kieffer, J. J.** Gen. Insect., fasc. 152, p. 268

This genus is distinguished from all other Porricondylids by the extremely long, narrow wings (plate 4, figures 1, 2), the third vein being united to subcosta by a very oblique crossvein and joining the margin well beyond the apex. The female has 12 or 13, and in one case, 16 antennal segments, the fifth with a short stem about one-fourth the length of the basal enlargement. The male has 16 antennal segments, the fifth with a stem ranging from one-third the length of the basal part to more than twice its length. The palpi are quadriarticulate. The ovipositor is short, biarticulate. The male genitalia are moderate, usually with a short, greatly swollen terminal clasp segment (plate 5, figures 1, 2, 3). The type of this genus, *C. angustipennis* Winn., is in an excellent state of preservation at the University of Bonn and is easily recognized by the very narrow wings. But little is known concerning the life history of these forms.

Key to species

a 12 antennal segments, females

- b* Abdomen reddish brown, length 1 mm; wings very narrow, with a length about five times the width..... *graminis* Felt, C. 570
bb Abdomen reddish yellow, length 2 mm; wings rather broad, with a length about four times the width..... *temeritatis* Felt, C. 41546b
bbb Abdomen pale yellowish, length 3 mm; wings broad, with a length about three times the width..... *sylvestris* Felt, C. 1477

aa 13 antennal segments, females

- b* Fifth antennal segment with a stem one-quarter the length of the basal enlargement
c Abdomen carmine, length 1.5 mm, the basal enlargement of the fifth antennal segment with a length six times its diameter, the fourth palpal segment with a length four times its diameter.....
sanguinia Felt, C. 1227
cc Abdomen yellowish brown, length 1.6 mm, the basal enlargement of the fifth antennal segment and the fourth palpal segment with a length five times their diameters, respectively..... *terrena* Felt, C. 525
ccc Abdomen yellowish orange, length 3 mm, the basal enlargement of the fifth antennal segment with a length five times its diameter, the fourth palpal segment with a length seven times its diameter.....
alta Felt, C. 481

- cccc* Abdomen yellowish brown, length 1 mm, the basal enlargement of the fifth antennal segment with a length four times its diameter, the fourth palpal segment with a length five times its diameter. Reared from *Poa pratensis*.....*pratensis* Felt, C. 256
- bb* Fifth antennal segment with a stem as long as the basal enlargement
- c* Abdomen brownish yellow, length 2.75 mm....*porrecta* Felt, C. 1484
- aaa* 16 antennal segments
- b* Fifth antennal segment with a stem one-third the length of the basal enlargement, female
- c* Abdomen pale orange, length 2 mm, the basal enlargement of the fifth antennal segment with a length three times its diameter.....*maculata* Felt, C. 560
- bb* Fifth antennal segment with a stem one-half longer than the basal enlargement, male
- c* Abdomen pale salmon, length 2 mm, the basal enlargement of the fifth antennal segment subglobose.....*pineta* Felt, C. 21622
- cc* Abdomen reddish brown, length 1.5 mm, the basal enlargement of the fifth antennal segment with a length one-half greater than its diameter
cornuta n. sp., C. 22097
- bbb* Fifth antennal segment with a stem twice the length of the basal enlargement, male
- c* Abdomen dark brown, length .75 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter.....*trifolii* Felt, C. 455
- cc* Abdomen fuscous yellowish, length 1.2 mm, the basal enlargement of the fifth antennal segment with a length one-half greater than its diameter.....*americana* Felt, C. 1478
- bbbb* Fifth antennal segment with a stem two and one-half times the length of the basal enlargement, male
- c* Abdomen pale yellowish, length 1 mm, the basal enlargement of the fifth antennal segment with a length three times its diameter.....*diervillae* Felt, C. 485
- cc* Abdomen pale yellowish, length 1.75 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter.....*pectinata* Felt, C. 21599
- ccc* Abdomen fuscous yellowish, length 1.3 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter.....*carolinae* Felt, C. 21624
- cccc* Abdomen light brownish yellow, length 1 mm, the basal enlargement of the fifth antennal segment with a length two and one-fourth times its diameter.....*capitata* Felt, C. 1480
- cccc* Abdomen dark yellowish brown, length 1.75 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter.....*ovata* Felt, C. 1496

***Colpodia graminis* Felt**

- 1907 Felt, E. P. N. Y. State Bul. 110, p. 146 (separate, p. 50) (*Porricondyla*)
1908 ——— N. Y. State Mus. Bul. 124, p. 416

This female was taken on quack grass, *Agropyron repens*, at Albany, N. Y., July 14, 1906.

Female. Length 1 mm. Antennae about as long as the body, sparsely haired, dark brown; 12 segments, the fourth with a short stem one-fourth the length of the subcylindric basal portion; terminal segment prolonged, subcylindric, one-half longer than the preceding. Palpi; the first segment short, subquadrate, the second rather long, slender basally, swollen distally, the third two-thirds the length of the second, stout, narrowly oval, the fourth a little shorter and more slender than the third, the fifth one-half longer than the fourth, broad, flattened. Mesonotum dark brown. Scutellum deep carmine, postscutellum reddish. Abdomen reddish brown, lighter distally. Legs a nearly uniform pale brown; claws stout, strongly curved, slightly swollen at the distal fourth, simple. Ovipositor short, lobes biarticulate, basal portion subquadrate, distal part suborbicular. Type Cecid. 570.

***Colpodia temeritatis* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 416

Described from a female reared September 9, 1907 apparently from ash, *Fraxinus*, leaves bearing a purplish green, subglobular gall some 5mm in diameter, taken near Albany. This gall appears to be the one Osten Sacken originally described under the name of *C. pelleri*. It is very doubtful if this insect is the true cause of the deformity.

Female. Length 2 mm. Antennae one-half the length of the body, sparsely haired, reddish brown, yellowish basally; 12 segments, the fifth with a stem one-half the length of the somewhat stout basal enlargement, which latter has a length three times its diameter, terminal segment greatly produced, with a length six times its diameter and evidently composed of two closely fused segments. Palpi; first segment rather stout, rectangular, the second one-half longer than the first, the third a little longer and more slender than the second, the fourth one-half longer and more slender than the third. Face yellowish. Mesonotum brownish yellow, the broad submedian lines yellowish. Scutellum brownish red, postscutellum pale yellowish. Abdomen pale reddish yellow. Wings rather broad, hyaline, costa fuscous yellowish. Halteres pale orange, yellowish basally. Coxae pale yellowish; femora, tibiae and tarsi light fuscous yellowish; claws strongly curved, simple, the pulvilli longer than the claws. Ovipositor short, terminal lobe narrowly oval. Type Cecid. a1546b.

***Colpodia sylvestris* Felt**

1914 **Felt, E. P.** N. Y. Ent. Soc. Jour. 22:126

This midge, allied to *C. temeritatis* Felt, was taken in August 1909 by Mr C. P. Alexander at Woodworth's lake in the Adirondacks at an altitude of 1550 feet. A detailed description is given in the citation above.

***Colpodia sanguinia* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 416

This species was taken on a window at Nassau, N. Y., July 15, 1907. Midges have been reared recently by Dr J. M. Aldrich from an almost pure blue grass sod.

Female. Length 1.5 mm. Antennae nearly as long as the body, sparsely haired, brown; 13 segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length six times its diameter; terminal segment slightly produced, narrowly fused with the preceding and broadly rounded apically. Palpi; first segment long, incrassate, the second stout, with a length three times its diameter, the third a little longer, more dilated, the fourth a little longer than the third, with a length four times its diameter. Mesonotum light brown, yellowish posteriorly. Scutellum yellowish and carmine, postscutellum yellowish. Abdomen a variable carmine, the basal segments clouded with fuscous, the distal ones pale yellowish. Wings hyaline, costa light straw. Halteres yellowish basally, carmine apically. Legs a nearly uniform yellowish straw, the articulations variably tinged with dark carmine, the distal tarsal segments reddish or reddish brown; claws stout, strongly curved, slightly swollen subapically, simple, the pulvilli a little shorter than the claws. Ovipositor short, the distal segment broadly oval. Type Cecid. 1227.

Male. Length 1.5 mm. Antennae more than twice the length of the body, sparsely haired, yellowish brown; 16 segments, the fifth with a stem two and one-half times the length of the basal enlargement, which latter has a length about twice its diameter. Palpi; first segment slender, with a length fully four times its diameter, the second dilated, with a length less than three times its diameter, the third a little longer and more slender than the second, the fourth one-fourth longer than the third. Mesonotum yellowish brown, the submedian lines yellowish. Scutellum and postscutellum pale yellowish. Abdomen yellowish orange, the genitalia fuscous. Halteres yellowish basally, fuscous apically. Coxae yellowish. Legs a nearly uniform fuscous yellowish; claws slender, strongly curved, the pulvilli a little shorter than the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment short, smooth, narrowly oval; dorsal plate short, deeply and roundly emarginate, the lobes narrowly rounded; ventral plate long, divided, the lobes roundly truncate. Harpes stout, heavily chitinized and with a heavy subapical spur. Cecid. a2636.

The structure of the male genitalia indicates a close relationship to *C. trifolii* Felt from which this species may be separated by the lighter color, the longer stems of the flagellate antennal segments and the distinctly shorter terminal clasp segment.

Colpodia terrena Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 416

The female was taken on quack grass, *Agropyron repens*, at Albany, N. Y., July 7, 1906.

Female. Length 1.35 mm. Antennae a little shorter than the body, sparsely haired, light brown, yellowish basally; 13 segments, the fifth with a stem about one-fourth the length of the cylindric basal enlargement, which latter has a length five times its diameter; terminal segment somewhat produced and narrowly fused with the



Fig. 14 *Colpodia terrena*; palpus, enlarged (original)

preceding. Palpi; first segment long, slender, the second with a length three times its diameter, the third subequal, the fourth one-half longer than the third. Face yellowish. Mesonotum slaty brown with a broad, median, sooty yellow stripe continued laterally and expanded posteriorly. Scutellum and postscutellum dull reddish. Abdomen a yellowish brown, sparsely clothed with fine hairs. Wings hyaline, costa light brown. Halteres pale yellowish basally, fuscous reddish apically. Legs a nearly uniform fuscous straw, tarsi slightly darker;

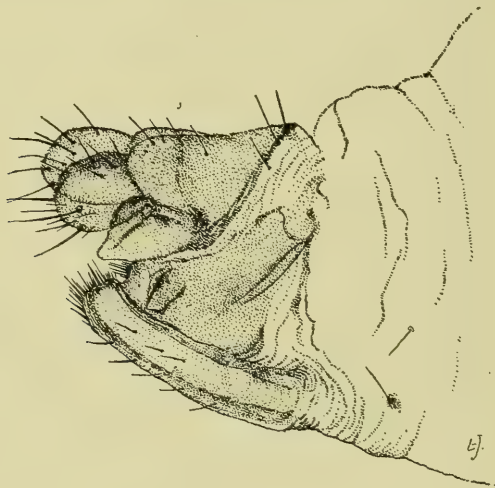


Fig. 15 *Colpodia terrena*; lateral view of the abdomen and ovipositor, enlarged (original)

claws stout, strongly curved, distinctly enlarged subapically, the pulvilli shorter than the claws. Ovipositor short, terminal lobe broad, broadly rounded. Type Cecid. 525.

Colpodia alta Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 416

Described from a female taken on hard pine, *Pinus rigida*, at Karner, N. Y., July 5, 1906.

Female. Length 3 mm. Antennae extending to the fourth abdominal segment, sparsely haired, dark brown, yellowish basally; 13 segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length five times its diameter; terminal segment very narrowly fused with the preceding, slightly produced and narrowly rounded apically. Palpi; first segment with a length five times its diameter, the second two-thirds as long, the third about as long as the second, the fourth one-half longer than the third, with a length seven times its diameter. Mesonotum fuscous yellowish, the submedian lines indistinct. Scutellum and post-scutellum fuscous yellowish. Abdomen a nearly uniform yellowish orange. Wings hyaline, costa light brown. Halteres yellowish basally, fuscous apically. Legs a pale straw; claws slender, strongly curved, simple, the pulvilli a little shorter than the claws. Ovipositor short, biarticulate, the terminal segment broadly oval. Type Cecid. 481.

Colpodia maculata Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 416

This pale orange female was taken on pine, *Pinus strobus*, at Albany, N. Y., July 16, 1906.

Female. Length 2 mm. Antennae extending to the fourth abdominal segment, sparsely haired, dark brown, yellowish basally; 16 segments, the fifth with a stem one-third the length of the cylindric basal enlargement, which latter has a length three times its diameter; terminal segment somewhat produced, tapering to a narrowly rounded apex. Palpi presumably quadriarticulate. Face pale orange. Mesonotum bright orange, broadly margined laterally with fuscous. Scutellum pale orange, with indistinct reddish markings laterally, postscutellum pale yellowish. Abdomen pale orange, rather sparsely clothed with fine setae, each segment broadly and rather distinctly marked with fuscous, the color being deeper distally and somewhat paler basally; terminal segment nearly black, incisures and pleurae pale yellowish. Wings hyaline, slightly fuscous, costa dark brown. Halteres ferruginous. Coxae pale orange, femora, tibiae and basal tarsal segments ferruginous, the three distal tarsal segments silvery white; claws slender, strongly curved, simple, the pulvilli rudimentary. Ovipositor short, biarticulate, the distal segment narrowly oval. Type Cecid. 560.

Colpodia pratensis Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 416

The species was first taken on huckleberry, *Gaylussacia baccata*, and apparently reared from June grass, *Poa*

pratensis, July 8 and 28, 1886 by the then Division of Entomology at Washington.

Female. Length 1.25 mm. Antennae as long as the body, apparently naked, dark brown; 13 segments, the fifth subsessile, with

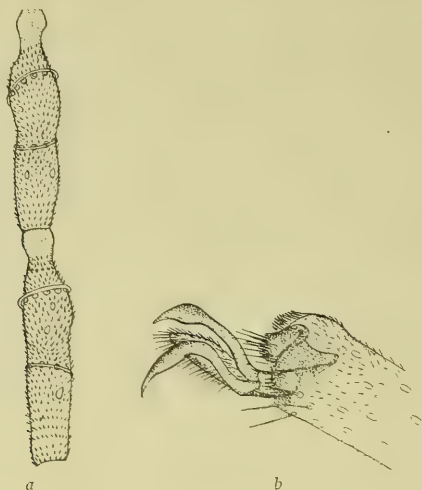


Fig. 16 *Colpodia pratensis*, female; *a*, fifth and sixth antennal segments; *b*, lateral view of claw and tip of the last tarsal segment, enlarged (original)

a length six times its diameter; terminal segment reduced. Palpi; the first segment long, subrectangular, the second about one-half the length of the first, the third a little longer than the second and the fourth one-half longer than the third; face yellowish fuscous. Mesonotum dark reddish brown, the posterior median area reddish, submedian lines pale reddish, sparsely ornamented with fine setae. Scutellum dark reddish with sparse apical setae, postscutellum a little darker. Abdomen a nearly uniform dull brown, rather thickly clothed with very fine, yellowish hairs. Costa light brown, halteres yellowish transparent. Legs pale brown; claws stout, strongly curved, simple, with a subapical, fusiform swelling. Ovipositor short, terminal lobes suboval. Type Cecid. 256.

Colpodia porrecta Felt

1914 Felt, E. P. N. Y. Ent. Soc. Jour. 22:126

The females are easily distinguished by the unusually long stems of the flagellate antennal segments. They were collected August 21, 1909 by Mr C. P. Alexander at Woodworth's lake in the Adirondacks, altitude 1570 feet. A detailed description is given in the citation above.

Colpodia pinea Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 145 (separate, p. 48)
(*Porricondyla*)

1908 ———— N. Y. State Mus. Bul. 124, p. 416

This male was taken at Davidson's River, N. C., September 24, 1906 on a pine, the heartwood of which was infested by *Monardialignivora*.

Male. Length 2 mm. Antennae longer than the body, sparsely haired, yellowish brown, yellowish basally; 16 segments, the fifth with a stem one-half longer than the subglobular enlargement. Palpi; the first segment slender, elongate, second and third a little longer and stouter, and the fourth slender and one-fourth longer than the preceding two. Mesonotum light brown, yellowish posteriorly, submedian lines broad, yellowish. Scutellum light reddish, postscutellum yellowish. Abdomen pale salmon, the color slightly deeper on the basal and antepenultimate segments; genitalia fuscous yellowish. Wings hyaline, costa light brown. Halteres yellowish basally, light fuscous apically. Coxae pale salmon, legs a nearly uniform light fuscous yellowish, all the tarsi missing; claws probably simple. Genitalia; basal clasp segment stout, produced internally and with a conspicuous curved submedian tooth extending posteriorly almost as far as the terminal clasp segment; the latter stout, broadly rounded apically and with a subapical comb. Dorsal plate broad, narrowly emarginate, the lobes broadly rounded, obliquely truncate, setose; ventral plate apparently composed of two narrow, widely separated setose lobes. Harpes heavy, converging, fused distally; style short, stout, narrowly rounded. (Plate 5, figure 2.) Type *Cecid.* a1622.

Colpodia cornuta n. sp.

The male described below was reared April 27, 1911 from a large collection of oak spangle galls, probably those of *Neuroterus umbilicatus* in which was a small amount of debris. This material was collected October 31, 1910 by Miss Cora H. Clarke at the Arnold arboretum, Jamaica Plain, Mass.

Male. Length 1.5 mm. Antennae one-fourth longer than the body, sparsely haired, dark brown, the stems semitransparent; 16 segments, the fifth with a stem one-half longer than the subcylindric basal enlargement, which latter has a length about twice its diameter; terminal segment reduced, narrowly oval. Palpi; first segment subquadrate, the second narrowly oval, the third with a length about twice its diameter, the fourth probably one-half longer than the third. Mesonotum shining dark brown, the submedian lines sparsely haired. Scutellum fuscous yellowish, sparsely setose, postscutellum yellowish brown. Abdomen reddish brown; genitalia fuscous. Wings hyaline, costa dark brown. Halteres

pale fuscous yellowish, reddish apically. Coxae, femora and tibiae a pale fuscous yellowish, the tarsi slightly darker; claws rather long, swollen subapically, simple; the pulvilli about two-thirds the length of the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment short, swollen and with a conspicuous, probably bidentate spine; dorsal plate long, broad, deeply and narrowly incised, the lobes broad, roundly truncate; ventral plate long, broad, broadly and triangularly emarginate, the lobes rather short and broadly rounded. Harpes stout, each with two heavy, recurved spines apically; style short, stout. Type Cecid. a2097.

***Colpodia trifolii* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110:145 (separate, p. 49) (Porricondyla)
 1908 ————— N. Y. State Mus. Bul. 124, p. 445

Described from a male taken on white clover, *Trifolium repens*, at Albany, N. Y., July 3, 1906.

Male. Length .75 mm. Antennae almost three times as long as the body, sparsely haired, dark brown; 16 segments, the fifth with a stem twice the length of the subcylindric basal enlargement, the latter with a length over twice its diameter. Palpi; the first segment long, slightly dilated apically, the second short, rather broadly oval, the third about as long, more slender, the fourth a little longer than the third. Mesonotum dark brown, submedian lines indistinct. Scutellum pale orange, postscutellum and abdomen dark brown. Genitalia slightly fuscous, sparsely clothed with yellowish hairs. Wings hyaline (Plate 4, figure 1), costa dark brown. Halteres pale yellowish. Legs nearly uniform dark brown; claws simple, uniformly curved, with a swelling subapically. Genitalia; basal clasp segment stout, internally with a narrowly rounded lobe at the distal third; terminal clasp segment greatly swollen basally, tapering to a narrow, recurved apex. Dorsal plate broad, deeply incised, the lobes well separated, broadly rounded, minor lobes rather broad, broadly and triangularly emarginate. Harpes stout, irregular, with a falciform, recurved spine and a broadly rounded, finger like process distally; style long, slender, strongly curved at the distal fourth. Type Cecid. 455.

***Colpodia americana* Felt**

1914 **Felt, E. P.** N. Y. Ent. Soc. Jour. 22:124

The male described in detail in the citation above was taken by Mr C. P. Alexander August 14, 1909 on the east shore of Woodworth's lake in the Adirondacks, altitude 1550 feet.

***Colpodia diervillae* Felt**

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 145-46 (separate, p. 49)
(*Porricondyla*)

1908 ——— N. Y. State Mus. Bul. 124, p. 417

This midge was taken on bush honeysuckle, *Diervilla lonicera*, at Karner, N. Y., July 5, 1906.

Male. Length 1 mm. Antennae one-half longer than the body, sparsely haired, dark brown, yellowish basally; 16 segments, the fifth with a stem two and one-half times the length of the sub-cylindric basal enlargement, the latter with a length nearly thrice its

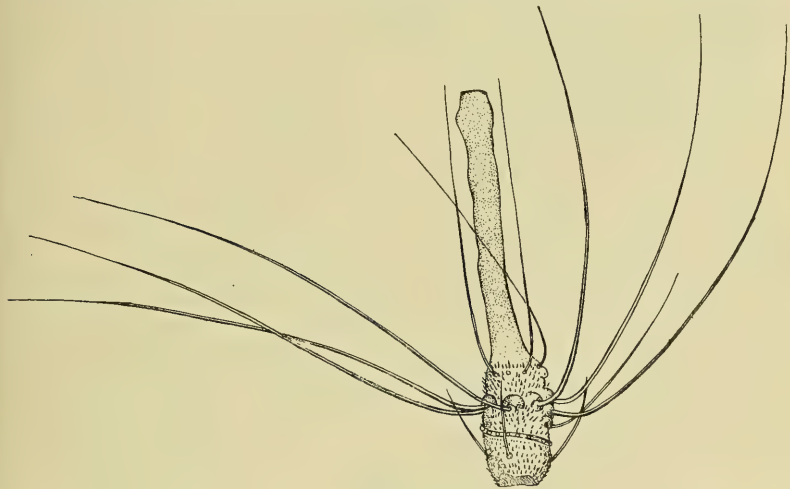


Fig. 17 *Colpodia diervillae*; fifth antennal segment of male, enlarged (original)

diameter; terminal segment narrowly oval, obtusely rounded. Palpi; the first segment short, subquadrate, the second very long, slender, possibly composed of two fused, the third more slender, less than one-half as long as the second, the fourth one-half longer and more slender than the third. Face yellowish. Mesonotum reddish, submedian lines yellow. Scutellum, postscutellum and abdomen pale yellowish. Wings very long, narrow, hyaline, costa dark brown. Halteres pale yellowish. Legs a nearly uniform dark brown; claws simple, long, uniformly curved. Genitalia; basal clasp segment stout, obliquely truncate; terminal clasp segment short, stout, subtruncate and at the internal angle a stout, chitinous spur one-fifth the length of the segment. Dorsal plate broad, deeply and triangularly incised; ventral plate apparently narrow, narrowly rounded. Harpes diverging basally, approximate distally, with a heavy, recurved, acute spine; at the distal third there is a heavy, chitinous spine, possibly connected with this organ; style long, narrow, acute. (Plate 5, figure 3.) Type Cecid. 485.

***Colpodia carolinae* Felt**

- 1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 145 (separate, p. 49) (Porri-condyla)
1908 ————— N. Y. State Mus. Bul. 124, p. 417

One male was taken on the window of a forest hut at Davidson's River, N. C., September 26, 1906.

Male. Length 1.3 mm. Antennae one-half longer than the body, sparsely haired, yellowish brown, yellowish basally; 16 segments, the fifth with a stem twice the length of the basal cylindric enlargement, the latter with a length hardly twice its diameter; terminal segment subconical. Palpi; the first segment curved, slender and about as long as the slightly stouter second and the subequal third, the fourth nearly twice the length of the third. Face yellowish. Mesonotum fuscous yellowish, submedian lines yellowish, the area between the submedian lines distinctly lighter than the sublateral areas. Scutellum reddish brown, postscutellum yellowish. Abdomen fuscous yellowish, genitalia slightly fuscous. Wings (Plate 4, figure 2) hyaline, costa light brown. Halteres yellowish basally, fuscous apically. Legs a nearly uniform yellowish fuscous, claws probably simple. Genitalia, basal clasp segment stout, obliquely truncate; terminal clasp segment rather stout, with a conspicuous subapical spine. Dorsal plate slender, deeply emarginate, the lobes broadly rounded, ventral plate obliquely narrowed posteriorly, deeply emarginate, the lobes subacute. Harpes heavily chitinized distally, with a strongly curved, sublateral tooth and an equally heavy submedian chitinous tooth; style strongly curved. (Plate 5, figure 1). Type Cecid. a1624.

***Colpodia capitata* Felt**

- 1914 **Felt, E. P.** N. Y. Ent. Soc. Jour. 22:125

The midge is easily separated from the allied *C. carolinae* Felt by the longer basal enlargement of the flagellate antennal segments and the peculiar genitalia. It was taken August 1909 by Mr C. P. Alexander at Woodworth's lake in the Adirondacks, altitude 1550 feet. A detailed description is given in the citation above.

***Colpodia pectinata* Felt**

- 1907 **Felt, E. P.** New Species of Cecidomyiidae II, p. 23 (Bryocrypta)
1908 ————— N. Y. State Mus. Bul. 124, p. 304

This peculiar species was reared at Albany, N. Y., August 8, 1907 from a jar containing basswood, *Tilia americana*, leaves bearing irregular, subglobular swellings at the base or along the midrib. It is probable that this insect emerged from the debris in the jar.

Male. Length 1.75 mm. Antennae about one-fourth longer than the body, sparsely haired, pale yellowish; 16 segments, the fifth with a stem two and one-half times the length of the subcylindric basal enlargement, the latter with a length one-half greater than its diameter; terminal segment somewhat produced, tapering to a subacute apex. Palpi; the first segment rather long, slender, the second a little longer, stouter than the first, the third a little longer than the second and the fourth about one-half longer than the third, more slender basally, slightly dilated apically. Mesonotum light yellowish. Scutellum, postscutellum and abdomen pale yellowish. Wings hyaline, costa pale straw. Halteres yellowish transparent. Legs a nearly uniform yellowish straw; claws rather long, slender, strongly curved, unidentate, the pulvilli rudimentary or wanting. Genitalia; basal clasp segment very short, stout, truncate distally; terminal clasp segment very short, stout, apically with a closely set row of chitinous teeth, other structures indistinct in the preparation. Type Cecid. a1599.

***Colpodia ovata* Felt**

1914 **Felt, E. P.** N. Y. Ent. Soc. Jour. 22:125

This midge is related to *C. diervillae* Felt and was taken by Mr C. P. Alexander August 24, 1909 in a quarry at Woodworth's lake in the Adirondacks, altitude 1540 feet. Detailed descriptions are given in the citation above.

ASYNAPTA H. LW.

- 1850 **Loew, H.** Dipt. Beitr., 4:20, 39
- 1860 **Rondani, C.** Atti Soc. Ital. Sci. Nat. Milano, 2:2, 5, 8
- 1862 **Osten Sacken, C. R.** Mon. N. Am. Dipt., 1:177
- 1876 **Bergenstamm, J. E. & Low, Paul.** Syn. Cecidomyidarum, p. 22
- 1877 **Karsch, F. A. F.** Revis. de Gallmucken, p. 14
- 1888 **Skuse, F. A. A.** Linn. Soc. N. S. Wales Proc., 3:37, 40, 44, 123
- 1892 **Rubsaamen, E. H.** Berl. Ent. Zeitschr., 37:329, 400
- 1892 **Theobald, F. V.** Acct. Brit. Flies, 1:51, 84
- 1894 **Kieffer, J. J.** Soc. Ent. Fr. Ann., 63:313, 339
- 1896 ————— Berl. Ent. Zeitschr., 41:3, 6, 29
- 1897 ————— Syn. Cecid. de Eur. & Alg., p. 46
- 1900 ————— Soc. Ent. Fr. Ann., 69:446-47
- 1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 420
- 1911 ————— N. Y. Ent. Soc. Jour., 19:40
- 1913 **Kieffer, J. J.** Gen. Insect., fasc. 152, p. 280

Members of this genus have four long veins, the crossvein lying nearly parallel to costa and the third joining the margin at or a little beyond the apex. The antennal segments are stemmed in the male, sessile in the female and usually composed of more than 16 segments, one American species having 28. The palpi are long quadriarticulate. Rubsaamen has illustrated the wing of *A. longicauda* H. Lw., showing subcosta uniting with the margin at the basal third, the third vein with the base somewhat curved,

joined to the middle of subcosta by a straight, parallel crossvein and uniting with the margin at the apex; the fifth joins the posterior margin at the distal fourth, the sixth near the basal half. The claws are slender, short and the pulvilli large and broad. The type species, *Cecidomyia longicollis* H. Lw., was fixed by Karsch, though seven years earlier Rondani designated *C. pectoralis* Winn. as the type. The latter, however, was not before Loew, when the genus was erected, and is not even congeneric. Later Kieffer cites this species as the type and then in 1897 mentions *A. longicauda* H. Lw., as the typical form. The type species, namely, *A. longicollis* H. Lw., has 24 sessile segments in the female, the male having 21 segments, the stem of the flagellate segments being three-fourths the length of the basal enlargement. Kieffer states that the male genitalia has the claw large and club-shaped.

Key to species

a 16 antennal segments

b Fifth antennal segment with a stem three-fourths the length of the basal enlargement.....*nobilis* Felt, C. 1464

bb Fifth antennal segment with a stem one-half longer than the basal enlargement

c Abdomen yellowish brown, length 2 mm, the basal enlargement of the fifth antennal segment with a length three times its diameter, the terminal clasp segment broadly triangular.....*furcata* Felt, C. 336

bbb Fifth antennal segment with a stem two and one-half times the length of the basal enlargement

c Abdomen yellowish brown, length 2.75 mm, basal enlargement of fifth antennal segment with a length one-half greater than its diameter, terminal clasp segment with a spur at the apical fourth.....

apicalis Felt, C. 1492

cc Abdomen fuscous yellowish, length 2.5 mm, basal enlargement of the fifth antennal segment with a length twice its diameter, terminal clasp segment with a spur near the basal half..*mediana* Felt, C. 1495

aa 17 or 18 antennal segments, the fifth with a stem about three-fourths the length of the basal enlargement

b Abdomen light yellow, length 2 mm, the basal enlargement of the fifth antennal segment with a length three-fourths greater than its diameter

flavida Felt, C. 504

bb Abdomen fuscous yellowish, length 1.5 mm, the basal enlargement of the fifth antennal segment with a length one-fourth greater than its diameter

umbra Felt, C. 1499

aaa 19 antennal segments

b Fifth antennal segment with a stem in the male three-fourths, and in the female one-fifth, the length of the basal enlargement

c Abdomen reddish orange, length, male, 2 mm, female 1.5 mm, the basal enlargement of the fifth (male) antennal segment with a length twice its diameter. Reared from *Rhabdophaga batatas* gall on willow.....

saliciperda Felt, C. a1815a

aaaa 20 or more antennal segments

b Antennal segments subsessile, females

c Abdomen whitish yellow, antennal segments 22, the fifth with a length three-fourths greater than its diameter, the ovipositor nearly as long as the abdomen.....*frosti* Felt, C. 1424

cc Abdomen yellowish orange, 23 antennal segments, the fifth with a length three-fourths its diameter, the ovipositor one-half the length of the abdomen.....*mangiferae* Felt, C. 1955

bb Antennal segments stemmed, males

c Fifth antennal segment with a stem three-fourths the length of the basal enlargement

d Abdomen fuscous yellowish, 21 antennal segments, the fifth having the basal enlargement with a length one-fourth greater than its diameter.....*americana* Felt, C. 1399

cc Fifth antennal segment with a stem as long as the basal enlargement

d Abdomen reddish brown, length 2 mm, 21 antennal segments, the basal enlargement of the fifth with a length one-half greater than its diameter.....*caudata* Felt, C. 1219

dd Abdomen orange yellow, length 1.5 mm, 23 antennal segments, the basal enlargement of the fifth with a length three-fourths greater than its diameter.....*cerasi* Felt, C. 236

ddd Abdomen light brown, length 1.5 mm, 23 antennal segments, the basal enlargement of the fifth with a length twice its diameter....
canadensis Felt, C. 1335

***Asynapta nobilis* Felt**

1913 Felt, E. P. Psyche, 20:135, 142-43

Described from a specimen collected by C. W. Johnson at Bridgeton, Me., August 25.

***Asynapta furcata* Felt**

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 148 (separate, p. 52) (*Winnertzia*)

1908 ————N. Y. State Mus. Bul. 124, p. 420

This species was taken June 21, 1906, at Nassau, N. Y.

Male. Length 2 mm. Antennae as long as the body, sparsely haired, fuscous; 16 segments, the fifth with a stem one-half longer than the basal enlargement, which latter has a length thrice its diameter; terminal segment with a rudimentary distal stem. Palpi; the first three segments subequal, the fourth slender and about twice the length of the preceding. Head testaceous. Mesonotum dark, sparsely clothed with long hairs. Scutellum and postscutellum testaceous. Abdomen testaceous with dark lateral edges and sparsely clothed with short, pale hairs. Wings hyaline, costa dark brown. Halteres long, pale straw. Legs testaceous at base, becoming dark brown at the tibiae, the two basal tarsal segments of the anterior legs brown, the others pale. The basal segment and most of the second of the posterior legs brown, the tip of the second and the remaining segments white, articulations pale straw; claws rather stout, slightly curved, unidentate and apparently with a very fine

tooth at the base of the well-marked stout one. Genitalia; basal clasp segment stout; terminal clasp segment stout, broad, irregularly triangular. Dorsal plate very broad, the lobes nearly truncate; ventral plate deeply emarginate, the lobes broadly rounded and widely separated. Harpes stout, convolute, truncate. Harpagones rather narrow, stout, apparently fused distally into a median chitinous spur and each bearing at its lateral posterior angle a stout, bifurcate process, each branch broadly rounded; style slender, broadly rounded. Type Cecid. 336.

***Asynapta apicalis* Felt**

1914 Felt, E. P. N. Y. Ent. Soc. Jour. 22:127

The male was taken August 24, 1909 by Mr C. P. Alexander in a quarry at Woodworth's lake in the Adirondacks, elevation 1540 feet. It is related to *A. furcata* Felt

***Asynapta mediana* Felt**

1914 Felt, E. P. N. Y. Ent. Soc. Jour. 22:128

The male was taken August 28, 1909 by Mr C. P. Alexander in a quarry at Woodworth's lake in the Adirondacks, altitude 1540 feet. It is allied to *A. apicalis* Felt.

***Asynapta umbra* Felt**

1914 Felt, E. P. N. Y. Ent. Soc. Jour. 22:128

The midge was taken by Mr C. P. Alexander in Johnstown Cemetery August 6, 1909. It is related to *A. flavida* Felt.

***Asynapta flavida* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 421

A male was taken on a window at Nassau N. Y. July 6, 1906.

Male. Length 2 mm. Antennae nearly as long as the body, sparsely haired, fuscous straw, yellowish basally; 18 segments, the fifth with a stem three-fourths the length of the ovate basal enlargement, which latter has a length about twice its diameter; terminal segment produced, irregularly conic, with a length twice its diameter, occasionally fused with the preceding. Palpi; first segment with a length three times its diameter, incrassate, the second as long as the first, subquadrate, the third one-half longer than the second, more slender, the fourth a little longer and more slender than the third. Face pale yellowish. Mesonotum dark brown, the submedian lines narrow, yellowish. Scutellum pale yellowish with sparse apical setae, postscutellum fuscous yellowish. Abdomen a nearly uniform light yellowish, slightly tinged with orange basally; genitalia fuscous, sparsely setose. Wings hyaline, membrane thickly red-haired, costa light brown. Halteres yellowish transparent. Coxae or basal portion of femora pale yellowish, the distal part of femora and tibiae fuscous straw, the tarsi slightly darker; claws long, evenly curved, unidentate, the pulvilli as long as the claws. Genitalia; basal clasp segment stout, obliquely truncate;

terminal clasp segment short, greatly swollen near the middle; dorsal plate long, the lobes divided, parallel, broadly rounded; ventral plate short, broadly and roundly emarginate, the lobes well separated, narrowly rounded. Harpes apparently truncate, irregular. Type Cecid. 504.

***Asynapta americana* Felt**

1912 Felt, E. P. N. Y. Ent. Soc. Jour. 20: 103-4

This species, easily separated by the shorter antennal stem, was taken at Hazelton, Pa., April 13, 1910, by Dr W. S. Dietz.

***Asynapta mangiferae* Felt**

1909 Felt, E. P. Ent. News, 20: 299-300

This West Indian species was reared by Prof. H. A. Ballou, government entomologist, from maggots found under the bark of small twigs of grafted Mango, probably *Mangifera indica*.

***Asynapta saliciperda* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 421

1909 ————— Ent. Soc. Ont. 39th Rep't, p. 46

Several examples of this species were reared in early April 1907, from a typical dry and old *Rhabdophaga batatas* O. S. gall received from Mr L. H. Weld of Evanston, Ill.

Male. Length 2 mm. Antennae as long as the body, sparsely haired, fuscous yellowish, 19 segments, the fifth with a stem three-fourths the length of the subcylindric basal enlargement, which latter has a length nearly twice its diameter; terminal segment produced, with a length nearly five times its diameter, tapering to a narrowly rounded apex. Palpi; the first segment short, stout, narrowly oval, the second broad, subrectangular, with a length fully one-half greater than the first, the third long, rather stout, with a length about twice the third, the fourth slender and about three-fourths longer than the third. Face fuscous yellowish, mesonotum dark brown, submedian lines sparsely haired, yellowish, scutellum reddish orange, postscutellum fuscous orange, abdomen a nearly uniform reddish orange, the segments sparsely haired posteriorly, membrane and pleurae reddish orange, genitalia light fuscous yellowish, wings hyaline, costa yellowish brown; halteres yellowish basally, reddish orange apically, coxae reddish orange, femora, tibiae and tarsi a light fuscous yellowish. Claws long, slender, evenly curved, unidentate, the pulvilli a little shorter than the claws. Basal clasp segment long, stout, roundly truncate, terminal clasp segment short, slender basally, greatly swollen near the distal third and with a heavily chitinized dentate apex.

Female. Length 1.5 mm. Antennae extending to the second abdominal segment, sparsely haired, dark brown; 19 segments, the

fifth with a stem about one-fifth the length of the subcylindric basal enlargement, which latter has a length about twice its diameter; terminal segment produced, tapering to a subacute apex. Palpi; the first segment rather long, slender, rectangular; the second twice the length of the first, rather stout, the third twice the length of the second, slender; and the fourth one-half longer than the third, more slender. Mesonotum dark reddish brown; the submedian lines sparsely haired; scutellum reddish brown, postscutellum

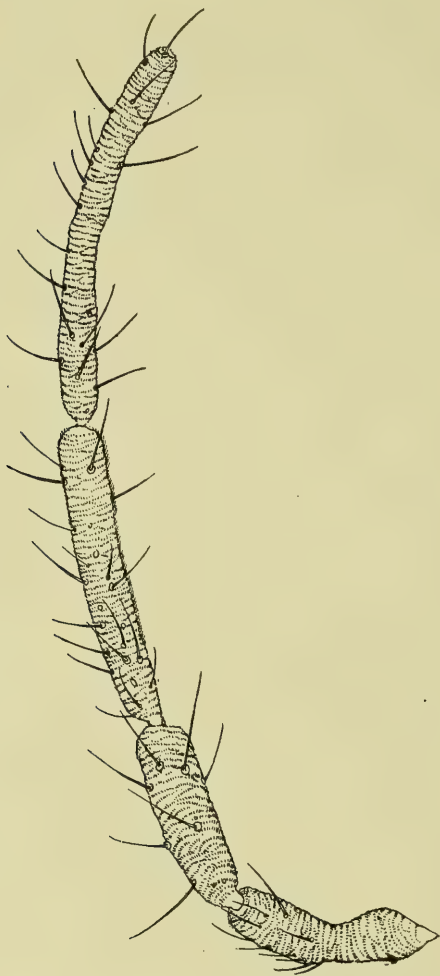


Fig. 19 *Asynapta saliciperda*; palpus, enlarged (original)

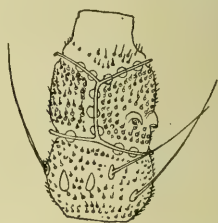


Fig. 18 *Asynapta saliciperda*; fifth antennal segment of female, enlarged (original)

yellowish; abdomen yellowish orange, rather thickly clothed with yellowish setae; halteres pale yellowish. Coxae, femora and tibiae

mostly pale yellowish, tarsi light fuscous. Claws long, slender, strongly curved, unidentate, the pulvilli shorter than the claws. Ovipositor pale orange, upturned, about as long as the abdomen,



Fig. 20 *Asynapta saliciperda*; tip of ovipositor, enlarged (original)

the terminal lobes long, biarticulate, the terminal segment narrowly oval. Type Cecid. ar815a.

***Asynapta frosti* Felt**

1913 Felt, E. P. Psyche, 20: 135, 143

Described from a specimen found by C. A. Frost, Framingham, Mass., in a jar containing sumac twigs and bees' nests June 1, 1910.

***Asynapta caudata* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 421

A male was taken on a window at Albany, N. Y., June 26, 1907.

Male. Length 2 mm. Antennae nearly as long as the body, sparsely haired, presumably pale yellowish; 21 segments, the fifth with a stem as long as the subcylindric basal enlargement, which latter has a length about one-half greater than its diameter; the penultimate segment subcylindric, sessile, the terminal one produced, irregularly subconical. Palpi; the first segment long, slender, with a length fully four times the diameter, the second about as long as the first, stouter, the third one-half longer than the second, more slender and the fourth a little longer than the third. Mesonotum presumably dark brown with yellowish, sparsely haired submedian lines. Scutellum and postscutellum probably yellowish brown, the abdomen presumably reddish brown. Wings hyaline, costa pale yellowish. Halteres probably pale yellowish. Legs presumably a pale straw; claws short, slender, strongly curved, unidentate, the pulvilli longer than the claws. Genitalia; basal clasp segment stout, obliquely rounded and with a conspicuous internal angle apically; terminal clasp segment stout, greatly swollen near the

middle, obtuse; dorsal plate very long, slender, deeply incised, the lobes long, narrow, narrowly rounded; ventral plate long, slender, deeply incised, the lobes long, slender, narrowly rounded. Harpes approximate, short, stout, narrowly rounded. Type Cecid. 1219.

***Asynapta cerasi* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 147-48 (separate, p. 51)

1908 ————— N. Y. State Mus. Bul. 124, p. 421

This species was taken at Albany, N. Y., June 21, 1906 on cherry, *Prunus* species.

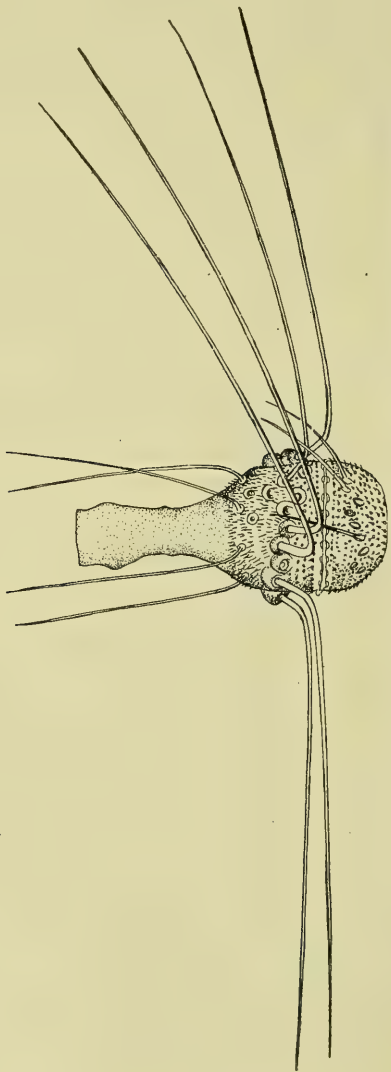


Fig. 21 *Asynapta cerasi*; seventh antennal segment of male, enlarged (original)

Male. Length 1.5 mm. Antennae about as long as the body, rather thickly white haired, light brown, yellowish basally; 23 segments, the fifth with a stem as long as the subcylindric basal enlargement, which latter has a length three-fourths greater than its diameter; terminal segment prolonged, conical. Palpi; the first segment rather prolonged, incrassate, the second twice the length of the first, stout, the third twice the length of the second, slender, the fourth one-fourth longer than the third, more slender. Face pale yellowish. Mesonotum rather dark brown, the posterior median area yellowish, submedian lines narrow, distinct, yellowish, ornamented with coarse setae. Scutellum pale orange yellow with sparse apical setae, post-scutellum pale orange yellow. Abdomen somewhat variable orange yellow, genitalia slightly fuscous. Wings (Plate 4, figure 7) hyaline, costa light brown. Halteres yellowish at the base, pale fuscous along the stem and whitish fuscous apically. Coxae pale yellowish orange. Legs a rather dark straw brown, lighter ventrally; claws stout, evenly curved, unidentate. Genitalia (Plate 7, figure 3); basal clasp segment stout, truncate; terminal clasp segment short, stout, with a heavy series of teeth. Dorsal plate broad, apparently divided, the lobes stout, diverging at the distal third, broadly rounded; minor lobes apparently divided, the distal third tapering to a subacute setose apex. Harpes short, stout, strongly chitinized and very irregular, the style short, narrow, heavily chitinized, extending anteriorly. Type Cecid. 236.

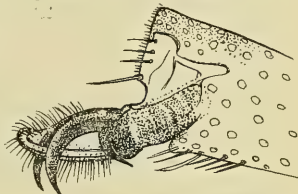


Fig. 22 *Asynapta cerasi*;
lateral view of claw and tip
of last tarsal segment of
male, enlarged (original)

***Asynapta canadensis* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 421

The species was received from the Museum of Comparative Zoology through the courtesy of Samuel Henshaw and bore a blue label marked as follows: "X 201, Can. Belanger."

Male. Length 1.5 mm. Antennae longer than the body, thickly haired, fuscous yellowish, yellowish basally; 23 segments, the fifth with a stem as long as the cylindric basal enlargement, which latter has a length twice its diameter. Palpi; first segment short, stout, the second narrowly oval, with a length three and one-half times its diameter, the third about twice the length of the second, slender, the fourth one-half longer than the third, slender. Face yellowish. Mesonotum reddish brown, the submedian lines yellowish. Scutellum and postscutellum yellowish. Abdomen rather thickly haired, light brown; genitalia fuscous brown. Wings hyaline, costa light straw. Halteres yellowish transparent. Coxae, femora and tibiae light brown, tarsi a little darker; claws long, stout, evenly curved, unidentate, the pulvilli as long as the claws. Genitalia; basal clasp segment stout, obliquely truncate; terminal clasp segment

short, stout, curved; dorsal plate long, the lobes nearly parallel, narrowly rounded and sparsely clothed with coarse setae apically; ventral plate short, deeply and triangularly emarginate, the lobes tapering to a narrowly rounded, sparsely haired apex. Type Cecid. 1335.

PORRICONDYLA Rond.

Epidosis H. Lw.

Dicroneurus Kieff. sub. gen.

- 1840 **Rondani, C.** Mem. Ila p. s. a. Ditterol. Ital. Parma, p. 14
 1846 ———— Nouv. Ann. Sci. Nat. Bologna, p. 370, 374
 1850 **Loew, H.** Dipt. Beitr., 4: 20, 21 (Epidosis)
 1862 **Osten Sacken, C. R.** Dipt. N. Am., 1: 177 (Epidosis)
 1863 **Schiner, J. R.** Fauna Austriaca Dipt., 2: 402 (Epidosis)
 1876 **Bergenstamm, J. E. & Low, Paul.** Syn. Cecidomyidarum, p. 23, 24
 1877 **Karsch, F. A. F.** Revis. de Gallmucken, p. 15
 1888 **Skuse, F. A. A.** Linn. Soc. N. S. Wales Proc., 3: 37, 40, 44, 115 (Epidosis)
 1892 **Rubsamen, E. H.** Berl. Ent. Zeitschr., 37: 329, 397 (Epidosis)
 1892 **Theobald, F. V.** Acct. Brit. Flies, 1: 51 (Epidosis)
 1894 **Kieffer, J. J.** Soc. Ent. Fr. Ann., 63: 313, 315, 318 (Epidosis)
 1895 ———— Berl. Ent. Nachr., 21: 122 (Dicroneurus)
 1896 ———— Berl. Ent. Zeitschr., 41: 2, 3, 6, 20, 21, 23 (Epidosis, Dicroneurus)
 1897 ———— Syn. Cecid. de Eur. & Alg., p. 44, 45 (Epidosis, Dicroneurus)
 1900 ———— Soc. Ent. Fr. Ann., 69: 441, 446 (Epidosis, Porricondyla)
 1904 **Meunier, F.** Soc. Sci. Brux. Ann., 28: 8 (Dicroneurus)
 1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 417
 1911 ———— N. Y. Ent. Soc. Jour., 19: 40
 1913 **Kieffer, J. J.** Gen. Insect., fasc. 152, p. 271

Members of this genus may be recognized by the possession of three long veins, the crossvein running parallel or nearly so to costa in connection with the forked fifth vein and the antennal segments in both sexes being greatly produced. The males usually have 16, rarely 15, antennal segments, the flagellate ones provided with a long, and sometimes a very long stem. The females usually have 12 to 14 antennal segments, the stem one-fourth to one-third the length of the basal enlargement. Kieffer has proposed to divide this group into two subgenera, namely, *Porricondyla* s. str. comprising those forms having the basal enlargement in the male antennae sub-spherical, while those of the female are more or less double or strongly contracted in the middle in connection with the claws being strongly curved and enlarged subapically; the other, *Dicroneurus* to include those species having the antennal segments cylindric in both sexes, the claws arched and not enlarged subapically. He has recently proposed a more detailed classification of this genus, see page 130. The type of the genus *Porricondyla* is *Cecidomyia albitalarsis* Meign.

A West Indian species, *P. gossypii* Coq.¹ may belong in this genus. It is recorded as living in cotton stems without producing an enlargement.

Key to species

- a* 12 antennal segments; females
 - b* Fifth antennal segment with a stem about one-fourth the length of the basal enlargement
 - c* Abdomen dark brown; length 1.5 mm, the fifth antennal segment with a stem one-third the length of the basal enlargement, which latter has a length five times its diameter; palpi moderate, the fourth segment nearly twice the length of the second; terminal lobes of the ovipositor oval and with a length twice the width.....*quercina* Felt, C. 62
 - cc* Abdomen yellowish brown; length 1.3 mm, the fifth antennal segment with a stem one-third the length of the basal enlargement, which latter has a length four times its diameter; palpi long, the fourth segment one-half longer than the third; ovipositor lobes narrowly oval, sparsely setose.....*correcta* Felt, C. 21628
 - ccc* Abdomen reddish orange; length 1.5 mm, the fifth antennal segment with a stem one-fourth the length of the basal enlargement, which latter has a length three times its diameter; palpi moderate, the fourth segment one-half longer than the third; ovipositor lobes narrowly oval, thickly setose.....*antennata* n. sp., C. 1360
 - ccc* Abdomen dark yellowish brown, length 1.75 mm, the fifth antennal segment with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length three times its diameter, with the fourth palpal segment one-half longer than the third; ovipositor lobes biarticulate, the basal portion narrowly oval, the distal segment fusiform.....*novae-angliae* Felt, C. 1503
 - bb* Fifth antennal segment with a stem one-third the length of the basal enlargement
 - c* Abdomen yellowish, mesonotum black.....*dietzii* Felt
 - bbb* Fifth antennal segment with a stem one-half the length of the basal enlargement
 - c* Abdomen reddish brown, mesonotum almost black.....*dorsata* Felt
- aa* 13 antennal segments, the fifth with a stem one-fourth the length of the basal enlargement; females
 - b* Abdomen fuscous yellowish, length 2 mm, the basal enlargement of the fifth antennal segment with a length three and one-half times its diameter; terminal lobes of the ovipositor narrowly oval, with a length three and one-half times the width.....*tuckeri* Felt, C. 1255
 - bb* Abdomen fuscous yellowish, basal enlargement of fifth antennal segment with a length twice its diameter, terminal lobes of the ovipositor with a length twice the width.....*vernalis* Felt, C. 1401
 - bbb* Abdomen dark brown, length 1.75 mm, the basal enlargement of the fifth antennal segment with a length four times its diameter; terminal lobes of the ovipositor lanceolate.....*setosa* Felt, C. 1487
 - bbbb* Abdomen reddish yellow, length 2.5 mm, the basal enlargement of the fifth antennal segment with a length four times its diameter, the ter-

¹ Coquillett, D. W. Can. Ent., 37: 200, 1905.

- minal lobe of the ovipositor tapering, with a length fully four times its width.....*caudata* Felt, C. 531
- aaa* 14 antennal segments
- b* Fifth antennal segment with a stem one-fourth or one-third the length of the basal enlargement; females
- c* Abdomen brown, the dorsal sclerites heavily chitinized anteriorly and posteriorly, length 1.5 mm.....*kärnerensis* Felt, C. 30
- cc* Abdomen dark reddish brown, the dorsal sclerites evenly chitinized, length 1.5 mm.....*carolina* Felt, C. a1625
- ccc* Abdomen yellowish brown, the dorsal sclerites evenly chitinized, length 3 mm.....*papillata* Felt, C. 1502
- bb* Fifth antennal segment with a stem one-half the length of the basal enlargement
- c* Abdomen fuscous yellowish, length 2 mm, the basal enlargement of the fifth antennal segment with a length three and one-half times its diameter, fourth palpal segment one-third longer than the third
borealis Felt, C. 155
- aaaa* 16 antennal segments; males
- b* Fifth antennal segment with a stem as long as the basal enlargement
- c* Abdomen fuscous yellowish, length 2 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter
canadensis Felt, C. 1334
- bb* Fifth antennal segment with a stem one-half longer than the basal enlargement
- c* Abdomen dark brown, length 1.5 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter; terminal clasp segment greatly enlarged apically.....*pini* Felt, C. 221
- cc* Abdomen orange yellow, length 1.5 mm, basal enlargement of the fifth antennal segment with a length one and three-fourths times its diameter; terminal clasp segment greatly swollen basally
dilatata Felt, C. a1149
- bbb* Fifth antennal segment with a stem twice the length of the basal enlargement
- c* Abdomen light yellowish brown, length 2 mm, the basal enlargement of the fifth antennal segment with a length two and one-half times its diameter; terminal clasp segment elongate, not greatly swollen near the middle.....*barberi* Felt, C. 948
- cc* Abdomen light yellowish, length 1 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter, the terminal clasp segment short, not greatly enlarged apically.....*flava* Felt, C. 151
- bbbb* Fifth antennal segment with a stem two and one-half times the length of the basal enlargement
- c* Abdomen fuscous yellowish, length 3 mm, the basal enlargement of the fifth antennal segment with a length twice its diameter; terminal clasp segment enlarged apically.....*hamata* Felt, C. a1626
- cc* Abdomen dark yellowish, terminal clasp segment not greatly enlarged apically.....*juvenalis* Felt, C. a2350
- ccc* Abdomen yellowish white, the segments brown banded, length 2 mm, the basal enlargement of the fifth antennal segment with a length one-half greater than its diameter; terminal clasp segment short, greatly swollen near the middle.....*wellsi* n. sp., C. 1564

Porricondyla quercina Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 147 (separate, p. 50-51)

1908 ————— N. Y. State Mus. Bul. 124, p. 418

A female was taken at Karner, N. Y., May 19, 1906, presumably on scrub oak, *Quercus prinoides*. A very similar form was collected May 25 at Kaslo, B. C., by Dr H. G. Dyar.

Female. Length 1.5 mm. Antennae as long as the body, thickly haired, dark brown; 12 segments, the fifth with a stem one-third the length of the subcylindrical enlargement; terminal segment slightly produced. Palpi; first segment stout, the second as long as the first, stouter, the third a little longer than the second, more slender, the fourth one-fourth longer than the third. Mesonotum dark brown, the sublateral and median posterior areas yellow. Scutellum pale reddish, postscutellum yellow. Abdomen dark brown. Wings hyaline, costa dark brown. Halteres reddish transparent basally, reddish fuscous apically. Legs, coxae and base of femora yellowish, distal portion of femora yellowish brown; tibiae and tarsi dark brown; claws stout, uniformly curved, unidentate. Ovipositor short, terminal lobes suboval. Type Cecid. 62.

Porricondyla antennata n. sp.

This species was taken July 11, 1909 on low grasses in the vicinity of water at Johnstown, N. Y., by Mr C. P. Alexander.

Female. Length 1.5 mm. Antennae about as long as the body, sparsely haired, fuscous yellowish; 12 segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length thrice its diameter; terminal segment produced, with a length six times its diameter, a constriction at the distal third. Palpi; the first segment with a length about three times its diameter, the second broadly oval, the third one-half longer and more slender, the fourth nearly twice the length of the third. Mesonotum dark orange. Scutellum and postscutellum pale orange. Abdomen reddish orange, the segments sparsely haired. Wings hyaline, costa pale straw. Halteres pale yellowish. Legs mostly pale straw; claws rather stout, evenly curved, simple, the pulvilli rudimentary. Ovipositor short, the terminal lobes narrowly oval. Type Cecid. 1360.

Porricondyla novae-angliae Felt

1914 **Felt, E. P.** Psyche 20:110

The structure of the ovipositor distinguishes this species, collected by Mrs A. T. Slosson at Franconia, N. H., from all other females referable to the genus.

***Porricondyla porrecta* Felt**

1912 Felt, E. P. N. Y. Ent. Soc. Jour., 20: 105

A female was taken on the window of a forest hut at Davidson's River, N. C., September 26, 1906.

***Porricondyla dietzii* Felt**

1912 Felt, E. P. N. Y. Ent. Soc. Jour., 20: 105

This species was taken June 4, 1910 at Hazelton, Pa., by Dr W. C. Dietz. It is closely allied to *P. porrecta* from which it is easily separated by the black mesonotum and the perceptibly shorter terminal segments of the antennae and palpi.

***Porricondyla dorsata* Felt**

1912 Felt, E. P. N. Y. Ent. Soc. Jour., 20: 238

The midge was taken by Mr D. B. Young at Dug mountain in the Adirondacks August 8, 1912. It is easily separated from other American species of *Porricondyla*, having 12 antennal segments, by the longer stem of the fifth segment.

***Porricondyla tuckeri* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 416

This female was taken by Mr E. S. Tucker in August at Lawrence, Kan., at an elevation of 900 feet. A closely allied female (C. 949) was taken at Las Vegas, N. M., August 14th by Mr H. S. Barber.

Female. Length 2 mm. Antennae nearly as long as the body, thickly haired, dark brown; 13 segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length about three and one-half times its diameter; terminal segment slightly reduced, tapering to a subacute apex. Palpi; first segment somewhat irregular, with a length four times its diameter, the second a little longer, dilated, the third longer than the second, the fourth about one-half longer than the third. Mesonotum fuscous yellowish, somewhat lighter laterally, the submedian lines broad, indistinct, yellowish. Scutellum fuscous yellowish, postscutellum concolorous. Abdomen rather thickly clothed with long hairs, fuscous yellowish, the dorsum of the first to fourth segments dark brown; genitalia ochreous. Wings hyaline, costa light brown. Halteres yellowish transparent basally, fuscous yellowish apically. Coxae and base of femora mostly yellowish, the distal part of femora and tibiae mostly dark brown, the tarsi yellowish white; claws strongly curved, unidentate, the pulvilli as long as the claws. Ovipositor short, with a small, lanceolate lobe. Type Cecid. 1255.

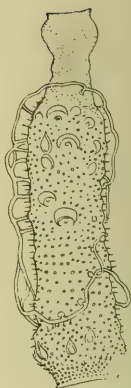


Fig. 23 *Porricondyla porrecta*; fifth antennal segment of female, enlarged (original)

***Porricondyla vernalis* Felt**

1912 Felt, E. P. N. Y. Ent. Soc. Jour., 20: 104-5

The species was taken May 16, 1910 by Dr W. G. Dietz at Hazelton, Pa. It is allied to *P. tuckeri* Felt from which it is easily separated by the stouter antennal segments and the broader lobes of the ovipositor.

***Porricondyla setosa* Felt**

1914 Felt, E. P. N. Y. Ent. Soc. Jour. 22:129

This midge was taken August 21, 1909 by Mr C. P. Alexander at Woodworth's lake in the Adirondacks, altitude 1570 feet. It is related to *P. caudata* Felt.

***Porricondyla caudata* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 418

Described from a female taken in a trap lantern at Nassau, N. Y., July 9, 1906.

Female. Length 2.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, fuscous yellowish; 13 segments, the fifth with a stem one-fourth the length of the subcylindric basal enlargement, which latter has a length four times its diameter; terminal segment somewhat reduced, slightly swollen near the distal fourth and tapering to a subacute apex. Palpi; first segment stout, with a length four times its diameter, the second one-fourth longer, stouter, the third a little longer than the second, the fourth one-half longer than the third. Mesonotum dark brown, the submedian lines, postscutellum and scutellum fuscous yellowish, the last with numerous apical setae. Abdomen reddish yellow, the basal three segments dark brown, distal segment yellowish. Wings slightly fuscous, costa light brown. Halteres yellowish basally, whitish apically. Legs a fuscous straw, the third and fourth tarsal segments whitish, the fifth light brown; claws long, evenly curved, unidentate, the pulvilli as long as the claws. Ovipositor short, the terminal lobes with a length four times the width, narrowly rounded. Type Cecid. 531.

***Porricondyla karnerensis* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 418

This species taken at Karner, N. Y., May 16, 1906.

Female. Length 1.5 mm. Antennae as long as the body, sparsely clothed with coarse setae, dark brown; 14 segments, the fifth with a stem one-third the length of the subcylindric basal enlargement, which latter has a length four times its diameter. Palpi; the first segment subcylindric, much produced, the second a little shorter than the first, the third as long as the first, a little stouter and the

fourth more slender and one-half longer than the third. Mesonotum very dark brown, a yellowish, median area posteriorly. Scutellum prominent, yellowish; postscutellum yellowish brown. Abdomen brown, sparsely clothed with yellowish hairs. Wings hyaline, costa light brown. Halteres yellowish. Legs rather dark brown,



Fig. 24 *Porricondyla karnenerensis*; lateral view of ovipositor and tip of abdomen, enlarged (original)

yellowish ventrally, tarsi slightly darker; claws stout, strongly curved, unidentate. Ovipositor short, the terminal lobes suboval. Type Cecid. 30.

***Porricondyla carolina* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 418

A female was taken September 26, 1906 on the window of a woodland hut at Davidson's River, N. C.

Female. Length 2 mm. Antennae shorter than the body, sparsely haired, fuscous straw; probably composed of 14 segments, the fifth with a stem one-half the length of the subfusiform basal enlargement, which latter has a length four times its diameter. Palpi; the first

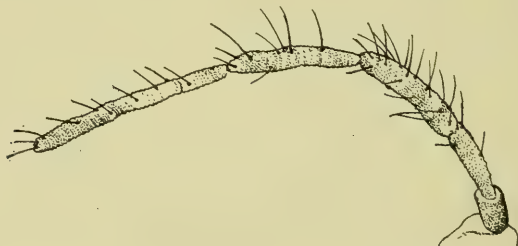


Fig. 25 *Porricondyla carolina*; palpus, enlarged (original)

and second segments long, slender, subequal, the third a little longer and the fourth one-half longer than the preceding. Mesonotum

fuscous brown, submedian lines yellowish, distinct. Scutellum pale reddish yellow, postscutellum yellowish. Abdomen fuscous, yellowish haired. Wings (Plate 4, figure 6) hyaline, costa dark brown. Halteres yellowish basally, fuscous apically. Legs fuscous yellowish, tarsi lighter; claws probably unidentate. Ovipositor short, lobes suboval. Type Cécid. a1625.

***Porricondyla papillata* Felt**

1914 Felt, E. P. Psyche 20:111

This large midge, collected by Mrs A. T. Slosson on Mount Washington is easily recognized by the two large sublateral groups of papillae at the posterior extremity.

***Porricondyla borealis* Felt**

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 147 (separate, p. 51)

1908 ——— N. Y. State Mus. Bul. 124, p. 418

The midge was taken on spruce, *Picea canadensis*, at Lake Clear, N. Y., June 7, 1906.

Female. Length 1.5 mm. Antennae nearly as long as the body, sparsely haired, dark brown, yellowish basally; 14 segments, the fifth with a stem one-third the length of the subcylindric basal

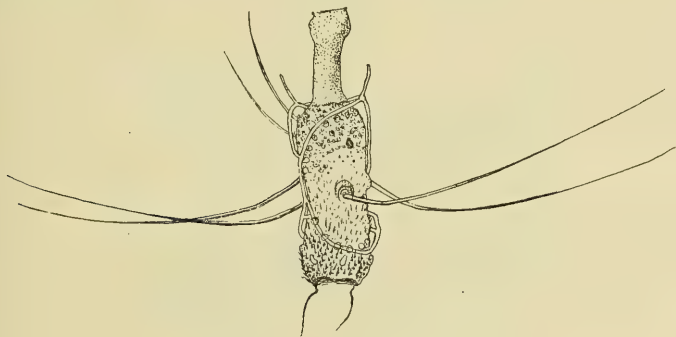


Fig. 26 *Porricondyla borealis*; sixth antennal segment of female, enlarged (original)

enlargement; terminal segment slightly prolonged, tapering to a narrowly obtuse apex. Palpi; the first segment long and slender, subfusiform, the second twice the length of the preceding, stouter, subfusiform, the third one-half longer than the preceding,



Fig. 27 *Porricondyla borealis*; female palpus, enlarged (original)

slender, subcylindric, the fourth one-half longer than the third, the distal fourth distinctly dilated, flattened. Mesonotum reddish brown, submedian lines yellowish. Scutellum yellowish apically, postscutellum and abdomen dark reddish brown. Wings hyaline, costa light brown. Halteres reddish yellow at the base, slightly fuscous apically. Legs nearly uniform pale brown, tibiae and tarsi

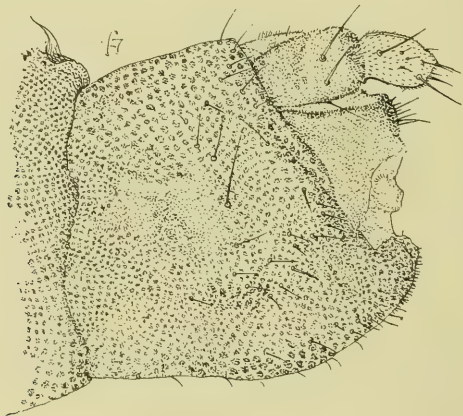


Fig. 28 *Porricondyla borealis*; lateral view of tip of abdomen showing the ovipositor, enlarged (original)

slightly darker; claws rather stout, uniformly curved, unidentate. Ovipositor rather short, the terminal lobe suboval. Type Cecid. 155.

Porricondyla canadensis Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 418

This male was secured from the Museum of Comparative Zoology through the courtesy of Samuel Henshaw and bore a blue label marked as follows: "X 195, Canada, Belanger."

Male. Length 2 mm. Antennae probably nearly as long as the body, sparsely haired, fuscous yellowish, yellowish basally, at least 8 and presumably 16 segments, the fifth with a stem as long as the cylindric basal enlargement, which latter has a length about one-half greater than its diameter. Palpi presumably quadriarticulate, the fourth segment apparently twice as long as the preceding. Face yellowish. Mesonotum yellowish brown. Scutellum and postscutellum yellowish. Abdomen fuscous yellowish, sparsely haired, genitalia fuscous orange, rather thickly haired. Wings hyaline, costa pale straw. Halteres pale yellowish. Legs mostly yellowish, tibiae and tarsi pale straw, claws toothed, pulvilli one-half the length of the claws. Genitalia; roundly triangular, basal clasp segment stout, dilated apically; terminal clasp segment short, stout, broadly rounded; dorsal plate short, slightly emarginate, the lobes broadly rounded, ventral plate deeply and triangularly emarginate, the lobes diverging, narrowly rounded. Other structures indistinct. Type Cecid. 1334.

Porricondyla pini Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 144-45 (separate, p. 48)

1908 ——— N. Y. State Mus. Bul. 124, p. 418

Described from a male taken on white pine, *Pinus strobus*, at Albany, N. Y., June 11, 1906.

Male. Length 1.5 mm. Antennae probably longer than the body, rather thickly clothed with coarse hairs, light brown; 16 segments, the fifth with a smooth stem one-half longer than the subcylindric basal enlargement, which latter has a length twice its diameter, the last segment with the basal enlargement fully twice the length of the preceding, subcylindric, the apex subconic. Palpi; the first segment subfusiform, with a length a little over twice its diameter, the second a little longer, stouter, the third more slender than the preceding, slightly longer, the fourth nearly twice the length of the third, more slender. Mesonotum dark brown, submedian lines with yellowish hairs. Scutellum pale orange with sparse apical setae, postscutellum a little darker. Abdomen rather dark brown, genitalia pale orange and rather thickly clothed with yellowish hairs. Wings hyaline, costa light brown. Halteres yellowish at base, whitish fuscous apically. Coxae pale orange. Legs nearly uniform pale straw; claws probably unidentate. Genitalia (Plate 6, figure 1); basal clasp segment very stout, obliquely truncate; terminal clasp segment broad at base, falciform, greatly swollen distally, the distal extremity truncate and bearing at the terminal angle a long, rather narrow appendage,

broadly rounded distally. Dorsal plate broad, narrowly and deeply incised, the lobes nearly approximate, truncate, setose; ventral plate narrow, broadly and roundly emarginate, the lobes short. Harpes long, stout, subtriangular at the base, distally apparently joined by an angulate, chitinous bar, each bearing distally two heavy, unidentate claws; style long, slender. Type Cecid. 221.

Porricondyla dilatata Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 418

The male was reared Sept. 7, 1907, from a jar containing the very common *Cecidomyia verrucicola* O. S. gall on linden, *Tilia americana*, taken at Highland, N. Y. This species presumably came from debris or dead vegetable tissues.

Male. Length 1.25 mm. Antennae as long as the body, sparsely haired, yellowish brown; 16 segments, the fifth with a stem one-half longer than the ovate basal enlargement, which latter has a length one-half greater than its diameter; terminal segment reduced, narrowly oval. Palpi; first segment stout, with a length three times its diameter, the second a little longer, more slender, the third a little longer than the second, the fourth about twice the length of the third. Face fuscous yellowish. Mesonotum shining dark brown, the submedian lines sparsely haired. Scutellum fuscous orange, postscutellum fuscous yellowish. Abdomen rather thickly clothed with fuscous hairs, a variable orange yellow, membrane and pleurae pale yellowish; genitalia fuscous. Wings hyaline, costa dark brown. Halteres semitransparent basally, pale orange distally; coxae and base of femora pale yellowish, the distal portion of femora, tibiae and tarsi dark brown; claws strongly curved, unidentate, the pulvilli as long as the claws. Genitalia; basal clasp segment short, stout, terminal clasp segment short, very greatly dilated basally and tapering to a narrowly rounded apex. Harpes apparently modified into irregular, recurved hooks, other structures indistinct. Type Cecid. a1149.

Porricondyla juvenalis Felt

1912 **Felt, E. P.** N. Y. Ent. Soc. Jour., 20: 239

This interesting form was taken by Mr D. B. Young at Elm Lake in the Adirondacks, New York, August 7, 1912. It is remarkable because of the greatly prolonged antennal segments and is easily separated from the allied *P. flavata* Felt by the lancetlike, recurved harpes.

Porricondyla wellsii Felt

1915 **Felt, E. P.** Can. Ent. 47: 227-28

The midge, easily distinguished by the greatly produced stems of the flagellate antennal segments and the short, greatly swollen terminal clasp segment, was taken by Mr D. B. Young at Wells, N. Y., July 5, 1914.

Porricondyla barberi Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 418

Described from a male taken at Williams, Ariz., June 6th by Mr H. S. Barber.

Male. Length 2 mm. Antennae a little longer than the body, thickly haired, yellowish; 16 segments, the fifth with a stem twice the length of the subcylindric basal enlargement, which latter has a length nearly three times its diameter; terminal segment reduced with a length nearly three times its diameter and tapering to a narrowly rounded apex. Palpi; first segment with a length about four times its diameter, the second one-half longer, more dilated, the third about one-half longer than the second, more slender and the fourth one-half longer than the third. Entire body a pale fuscous yellowish. Wings hyaline, costa pale yellowish. Halteres yellowish transparent. Legs pale yellowish; claws slender, evenly curved, unidentate, the pulvilli shorter than the claws. Genitalia; basal clasp segment stout, truncate distally; terminal clasp segment short, greatly swollen and with a slender tooth apically. Other structures indistinct. Type Cecid. 948.

Porricondyla hamata Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 146 (separate, p. 49-50)

1908 ——— N. Y. State Mus. Bul. 124, p. 419

This species was taken September 26, 1906 on the window of a woodland hut at Davidson's River, N. C. The same form (C. 1343) was taken August 23d by Prof. C. W. Johnson at Brookline, Mass. The wing is figured on plate 4, figure 3.

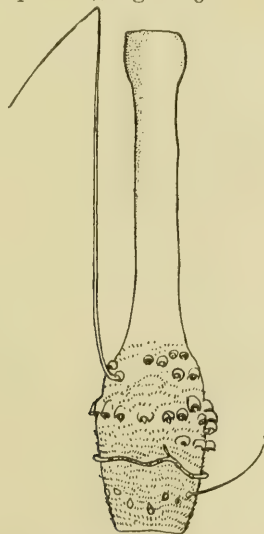


Fig. 29 *Porricondyla hamata*; fifth antennal segment of male, enlarged (original)

Male. Length 3 mm. Antennae one-fourth longer than the body, sparsely clothed with long hairs, fuscous yellowish; probably 16 segments, the fifth with a stem two and one-half times the length of the cylindric enlargement. Palpi; the first, second and third segments slender, subequal, each slightly longer than its predecessor, the fourth one and one-half times longer than the third; face yellowish; the mouth parts carmine. Mesonotum dark brown, submedian lines narrow, yellowish. Scutellum pale reddish, post-scutellum yellowish. Abdomen fuscous yellowish, the segments margined posteriorly with fuscous; genitalia light fuscous. Wings hyaline, costa light brown; halteres yellowish basally, fuscous apically. Legs fuscous yellowish, the last tarsal segments on the first and second pair of legs and the two distal segments on the third pair of legs, yellowish; claws probably unidentate. Genitalia; basal clasp segment broad, stout, truncate, internal angles with heavy chitinous spurs; terminal clasp segment stout, broadly expanded, truncate and with an apical triangular lobe; dorsal plate broad, deeply incised, the lobes widely separated, broadly rounded; ventral plate broadly rounded. Harpes stout, expanded, truncate, the internal angles with a pair of stout, recurved hooks; style slender, narrow and with a pair of sublateral processes at the distal third. (Plate 6, figure 2.) Type Cecid. ar626.

Porricondyla flava Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 146 (separate, p. 50)

1908 ——— N. Y. State Mus. Bul. 124, p. 419

A male was taken on red maple, *Acer rubrum*, at Lake Clear, N. Y., June 7, 1906.

Male. Length 1 mm. Antennae a little longer than the body, sparsely haired, dark brown; at least 12 and probably 16 segments, the fifth with a stem fully two and one-half times the length of the subcylindric basal enlargement, which latter has a length two and one-half times its diameter. Palpi; the first segment long, the basal two-thirds somewhat swollen, curved, the second about as long as the preceding, more slender, irregularly curved, the third a little shorter, stouter, slightly dilated distally, the fourth shorter than the preceding, more slender. Face pale yellowish, eyes large, black. Mesonotum pale brownish apically, yellowish posteriorly. Scutellum, postscutellum and abdomen light yellowish. Wings (Plate 4, figure 9) hyaline, costa pale straw. Halteres yellowish transparent. Legs nearly uniform pale straw; claws probably unidentate. Genitalia; basal clasp segment stout, obliquely truncate; terminal clasp segment stout, with a long, slender apical spur. Dorsal plate short, broad, broadly emarginate, the lobes obliquely truncate. Harpes broad, stout, convolute, broadly rounded; style stout, tapering. Type Cecid. 151.

- bb* Antennal segments 27, length 3.5 mm; abdomen reddish orange. Reared from hemlock..... *tsugae* Felt, C. 2375
- aaa* Stem of fifth antennal segment with a length two and one-half times the basal enlargement, males
- b* Antennal segments 20, length 2.5 mm; abdomen fuscous yellowish
multinoda Felt, C. 789

***Camptomyia montana* n. sp.**

The male described below was taken on a window at Wells, N. Y., July 5, 1914.

Male. Length 1.5 mm. Antennae a little longer than the body, sparsely haired, fuscous yellowish; 20 segments, the fifth with a stem one-fourth longer than the cylindric basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, with a length nearly three times its diameter, slightly constricted at the basal and apical third, and tapering to an obtusely rounded apex. Palpi; the first segment irregular, quadrangular, the second with a length about three times its diameter, the third nearly twice the length of the second, the fourth three-fourths the length of the third. Body mostly yellowish or yellowish white, the legs a pale yellowish straw; claws slender, evenly curved, unidentate, the pulvilli a little shorter than the claws. Genitalia; basal clasp segment stout; terminal clasp segment moderately long, tapering at both extremities; dorsal and ventral plates indistinct in the preparation. Type Cécid. 1565.

***Camptomyia aestiva* Felt**

1912 Felt, E. P. N. Y. Ent. Soc. Jour., 20: 104

A female was taken by Dr W. G. Dietz at Hazelton, Pa., June 21, 1909.

***Camptomyia tsugae* Felt**

1913 Felt, E. P. N. Y. Ent. Soc. Jour., 21: 214-15

Numerous specimens were reared from larval galleries of *Melanophila fulvoguttata* Harr., in dying hemlocks in New York City.

***Camptomyia multinoda* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 419 (Porricondyla)

This species was taken August 12, 1906 by Dr James G. Needham, on the door of a building at Lake Forest, Ill.

Male. Length 2.5 mm. Antennae one-fourth longer than the body, rather thickly haired, fuscous yellowish, yellowish basally;

20 segments, the fifth with a stem about two and one-half times the length of the subcylindric basal enlargement, which latter has

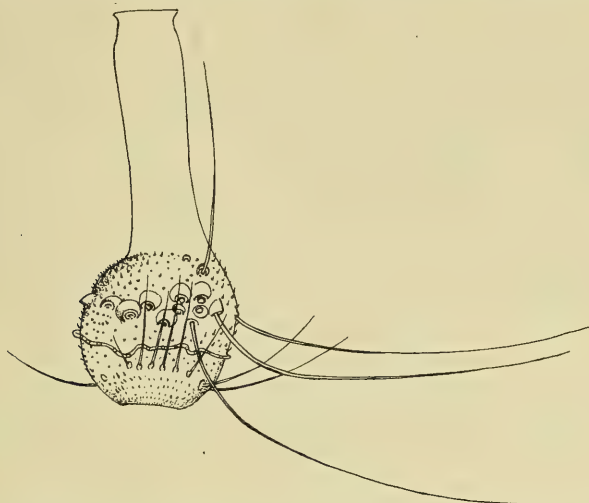


Fig. 30 *Camptomyia multinoda*; fifth antennal segment of male, enlarged (original)

a length one-fourth greater than its diameter, the distal two segments reduced, subfusiform. Palpi; first segment short, stout, subquadrate, the second somewhat produced, flattened, irregular and fully three times the length of the first, the third a little longer and more slender, the fourth a little shorter and stouter than the third. Mesonotum reddish brown, the submedian lines narrow, the posterior median area and scutellum yellowish, postscutellum reddish brown. Abdomen fuscous yellowish. Wings (Plate 4, figure 3) hyaline. Legs fuscous yellowish, tarsi lighter; claws slender, evenly curved, unidentate, the pulvilli a little longer. Genitalia (Plate 7, figure 4); basal clasp segment long, stout, obliquely truncate; terminal clasp segment short, stout, swollen near the middle; dorsal plate long, broad, deeply and broadly emarginate, the lobes broadly rounded; ventral plate broad, tapering, deeply and broadly emarginate, the lobes long, fingerlike; style long, slender, expanded distally. Described from alcoholic specimens. Type Cecid. 789.

DIRHIZA H. LW.

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- 1862 Osten Sacken, C. R. Dipt. N. Am., 1: 176
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- 1877 Karsch, F. A. F. Revis. de Gallmucken, p. 16
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- 1894 Kieffer, J. J. Soc. Ent. Fr. Ann., 63: 312, 317

- 1896 **Kieffer, J. J.** Berl. Ent. Zeitschr., 41: 3, 26
 1897 ————— Syn. Cecid. de Eur. & Alg., p. 44
 1900 ————— Soc. Ent. Fr. Ann., 69: 446
 1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 419
 1911 ————— N. Y. Ent. Soc. Jour., 19: 41
 1913 **Kieffer, J. J.** Gen. Insect., fasc. 152, p. 269

This genus is separated from *Porricondyla* Rond. by the antennae not being greatly prolonged in both sexes. The typical venation is illustrated on plate 4, figure 8. A number of American species having from 12 to 26 antennal segments, have been referred to this genus though, owing to the fact that we have not reared any species in this group, it is possible that some of the forms should be placed in other genera or that sexes described as distinct should belong together.

The type species, *Cecidomyia lateritia* H. Lw., has 14 antennal segments, the fifth of the male with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length two and one-half times its diameter; low, straight circumfili occur at the middle and subapically and are united by long fili. There is a subbasal whorl of sparse setae. The palpi are very long, quadriarticulate, the terminal segment being nearly twice the length of the preceding. Subcosta unites with costa just before the basal half; the third vein, joined to the middle of subcosta by a distinct crossvein parallel with costa, unites with the margin well beyond the apex, the basal portion being nearly straight; the fifth vein joins the posterior margin at the distal fourth, its branch at the basal third, the two uniting rather indistinctly near the basal fourth. Rubsaamen, illustrating the male genitalia, represents the basal clasp segment as short, broadly oval and with the apex internally ornamented with stout, presumably chitinous tubercles and states that the terminal clasp segment is wanting.

This is based on published descriptions supplemented by studies of a balsam preparation in the Berlin Natural History Museum made by Professor Rubsaamen and labeled as being from the Loew collection.

Key to species

- a* 12 antennal segments
 b Fifth antennal segment with a stem one-third the length of the basal enlargement
 c Abdomen yellowish, length 1 mm; female...*sylvestris* Felt, C. 175
aa 13 antennal segments
 b Fifth antennal segment with a stem one-fourth the length of the basal enlargement
 c Abdomen dark brown, length 2.5 mm; female...*hamata* Felt, C. 142
aaa 16 antennal segments at least

- b* Fifth antennal segment with a stem one-fourth the length of the basal enlargement; the latter with a length three times its diameter; fourth palpal segment one-fourth longer than the third
- c* Abdomen yellowish, length 3 mm; female.... *photophila* Felt, C. 45
- aaaa* 20 or more antennal segments
- b* Abdomen yellowish orange, length 3 mm; 24 antennal segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length three times its diameter; the fourth palpal segment one-fourth longer than the third..... *canadensis* Felt, C. 952
- bb* Abdomen light reddish brown, length 3 mm; 25 antennal segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length two and one-half times its diameter; third and fourth palpal segments nearly equal..... *montana* Felt., C. 953
- bbb* Abdomen pale yellowish, length 2 mm; 26 antennal segments, the fifth with a stem one-third the length of the basal enlargement; the fourth palpal segment one-half longer than the third
- multiarticulata* Felt, C. 831

***Dirhiza sylvestris* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 146-47 (separate, p. 50) (Porricondyla)

1908 ——— N. Y. State Mus. Bul. 124, p. 419

Described from a small, yellowish female, easily recognized by the 12 antennal segments, taken on low plants in a balsam woods, Lake Clear, N. Y., June 7, 1906.

Female. Length 1 mm. Antennae extending to the middle of the abdomen, sparsely haired, dark brown; 12 segments, the fifth with a stem one-third the length of the subcylindric basal enlargement, which latter has a length three times its diameter; terminal segment greatly produced, strongly constricted near the middle, acutely rounded distally. Palpi; the first segment prolonged, swollen distally, the second very long, irregular, the third one-half the length of the second, more slender, the fourth one-fourth longer than the third; face pale yellowish, eyes large, black. Mesonotum dark brown, submedian lines yellowish. Scutellum and postscutellum dark brown. Abdomen yellowish. Wings hyaline, costa light brown; halteres yellowish transparent basally, pale orange in the middle, the club whitish transparent. Legs pale straw; claws slender, slightly curved, unidentate. Ovipositor short, the terminal lobe ovate. Type *Cecid.* 175.

***Dirhiza hamata* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 144 (separate, p. 48)

1908 ——— N. Y. State Mus. Bul. 124, p. 419

This striking form appears to be rather common though nothing is known concerning its life history. It was first taken on an office window at Albany, N. Y., June 8, 1906 and was obtained several times under similar conditions a year later. Specimens of apparently the same form were taken July 17th at Kaslo, B. C., by A. N. Caudell.

Female. Length 2.5 mm. Antennae extending to the base of the abdomen, rather thickly haired, dark reddish brown; 13 seg-

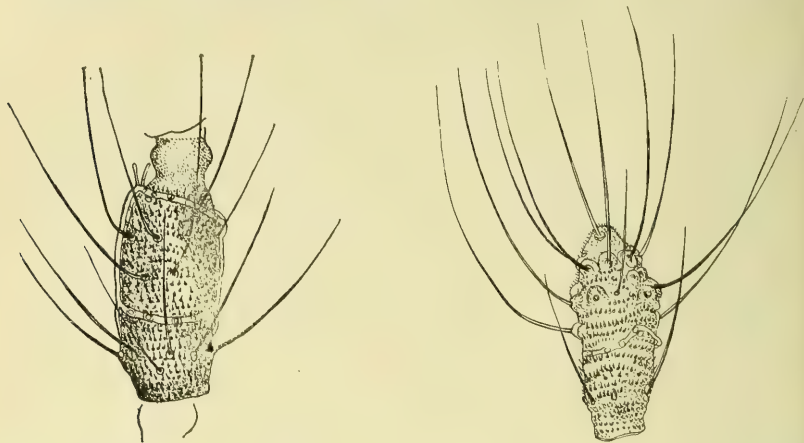


Fig. 31 *Dirhiza hamata*; sixth and terminal antennal segments of female enlarged (original)

ments, the fifth with a stem one-fourth the length of the subcylindric basal portion, which latter has a length three times its diameter; terminal segment slightly dilated distally, the apex obtusely rounded. Palpi; the first segment stout, somewhat irregular, the second a little longer than the first, subrectangular, the third one-fourth longer than the second, more slender, the fourth nearly twice the

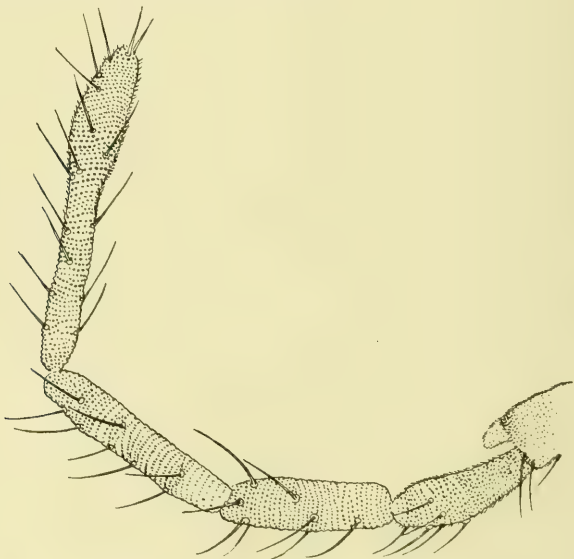


Fig. 32 *Dirhiza hamata*; female palpus, enlarged (original)

length of the third, more attenuate; head dark brown or black. Mesonotum black, shining, with a few scattered setae laterally. Scutellum and postscutellum dark brown. Abdomen dark brown, somewhat reddish at the sides. Wings hyaline, costa black. Legs black, tarsi with the first joint and basal four-fifths of the second dark brown, the remainder white; the third and fourth segments white, fifth slightly infuscated; claws stout, uniformly curved, simple. Ovipositor short; there are on each side, two apparently

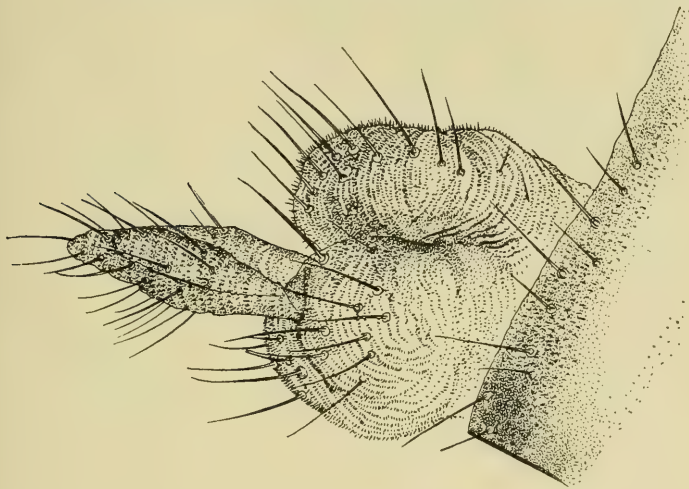


Fig. 33 *Dirhiza hamata*; tip of abdomen showing ovipositor, enlarged (original)

distinct plates, a dorsal and a ventral, both suboval, the dorsal pair supporting the terminal lobes, which latter are strongly constricted at the base, flattened, fusiform and thickly clothed with coarse setae.

The specimen appears to have been somewhat mutilated and has a pair of irregular, chitinous, hooklike processes (figure 34) which are probably connected with the oviducts. Type Cecid. 142.

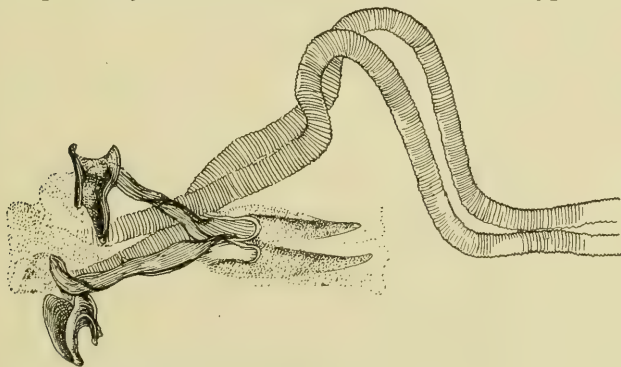


Fig. 34 *Dirhiza hamata*; hooks and associated structures, enlarged (original)

***Dirhiza photophila* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 420

A female was taken May 17, 1906 in a trap lantern at Nassau, N. Y.

Female. Length 3 mm. Antennae shorter than the body, sparsely haired, fuscous yellow, basally yellow; at least 17 segments, the fifth with a stem one-fourth the length of the subcylindric basal enlargement, which latter has a length thrice its diameter. Palpi; the first segment short, subquadrate, slightly swollen at the distal third, the second very long, the basal third slightly narrower than the enlarged distal portion, the third a little longer than the second, more slender and the fourth one-fourth longer than the third; face yellowish. Mesonotum yellowish with median and sublateral areas brownish, submedian lines sparsely clothed with pale hairs. Scutellum and postscutellum reddish brown. Abdomen yellowish. Wings hyaline, costa light brown; halteres yellowish transparent. Legs yellowish transparent, rather thickly clothed with reddish hairs,

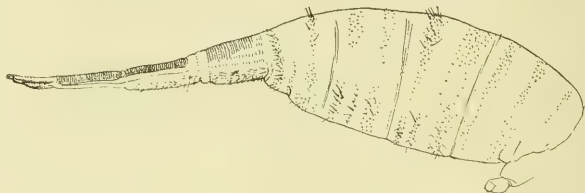


Fig. 35 *Dirhiza photophila*; lateral view of abdomen and ovipositor, enlarged (original)

tarsi missing; claws probably unidentate. Ovipositor two-thirds the length of the body, the terminal lobes suboval. Type Cecid. 45.

***Dirhiza montana* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 420

This species, received through the courtesy of the United States National Museum, was taken in the White mountains by Morrison.

Female. Length 3 mm. Antennae extending to the fifth abdominal segment, rather thickly haired, light fuscous yellowish; 25 segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length two and one-half times its diameter; terminal segment produced, with a length four times its diameter and tapering to a narrowly rounded apex. Palpi; first segment stout, with a length two and one-half times its diameter, the second one-half longer, slender, the third one-fourth longer than the second, the fourth about as long as the third. Mesonotum and scutellum reddish brown, postscutellum yellowish. Abdomen light

reddish brown. Wings hyaline, costa light brown. Halteres yellowish transparent. Legs yellowish brown, the tarsi lighter. Ovipositor about half the length of the abdomen, the terminal lobe narrowly oval. Type Cecid. 953.

***Dirhiza canadensis* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 420

A female was captured in Canada in May 1894.

Female. Length 3 mm. Antennae nearly as long as the body, sparsely haired, pale yellowish; 24 segments, the fifth with a stem one-fourth the length of the cylindric basal enlargement, which latter has a length three times its diameter; terminal segment slightly produced and tapering from the distal fourth to a subacute apex. Palpi; the first segment rectangular, with a length three times its diameter, the second one-half longer, somewhat dilated, the third about twice the length of the second, slender, the fourth as long as the third, more slender. Mesonotum yellowish brown. Scutellum and postscutellum yellowish. Abdomen yellowish orange. Wings hyaline (Plate 4, figure 8), costa yellowish brown. Halteres yellowish transparent. Legs pale yellowish. Ovipositor indistinct in the preparation, presumably nearly as long as the abdomen. Type Cecid. 952.

***Dirhiza multiarticulata* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 420

The pale yellowish female was taken by Mr E. G. Love at Palisades, N. Y., in July.

Female. Length 2 mm. Antennae nearly as long as the body, very hairy, light brown, basally yellowish; 26 segments, the first obconic, the second flattened basally, subglobose, the third with the basal portion greatly produced, the fifth with a stem one-third the length of the subcylindric basal enlargement, which latter is slightly constricted near the middle and with a length three times its diameter; terminal segment prolonged, more than twice the length of the preceding, tapering to an obtuse apex, thickly setose. Palpi; the first segment prolonged, subrectangular, the second stouter, fully one-half longer, the third more slender, nearly twice the length of the preceding and the fourth more slender and one-half longer than the third. Mesonotum pale reddish orange, the submedian lines and posterior median area pale yellow. Scutellum whitish yellow, postscutellum light yellow. Abdomen pale yellow. Wings hyaline, costa pale whitish. Halteres pale yellowish white, legs a pale fuscous yellowish, distal tarsal segments slightly lighter; claws rather stout, slightly curved, simple, pulvilli as long as the claws. Ovipositor missing. Type Cecid. 831.

Holoneurus altifilus Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 147 (separate, p. 51) (Porri-condyla)

1908 ——— N. Y. State Mus. Bul. 124, p. 420

This yellowish species was taken flying about skunk's cabbage, *Symplocarpus foetidus*, at Karner, N. Y., June 26, 1906.

Female. Length 1.25 mm. Antennae as long as the body, sparsely haired, fuscous; 12 segments, the fifth with a stem as long as the subcylindric basal enlargement, which latter has a length



Fig. 36 *Holoneurus altifilus*; fifth *a*, and sixth *b*, antennal segments of female, enlarged (original)

three and one-half times its diameter, the terminal segment with the basal portion produced, the apical third constricted and the stem represented by a small, subconical appendage. Palpi; the first segment long, slightly contracted basally, the second as long as the first, stouter, the third about as long as the second, more slender, the fourth one-half longer than the third, slightly swollen distally. Head black. Mesonotum and scutellum reddish yellow, the latter with a fuscous line at the apex, postscutellum and abdomen yellowish. Wings hyaline, costa yellowish. Halteres pale, the anterior legs fuscous at the base, tarsi paler, the posterior legs pale; claws



Fig. 37 *Holoneurus altiflus*; *a* lateral view of apex of abdomen and *b* anterior claw, enlarged (original)

stout, slightly curved, swollen near the distal fourth, unidentate. Ovipositor short, the terminal lobe suborbicular. Type Cecid. 398.

Holoneurus humilis Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 417 (Johnsonomyia)

The midge was taken on low blackberry, *Rubus villosus*, at Albany, N. Y., July 24, 1906.

Female. Length 1 mm. Antennae shorter than the body, sparsely haired, pale brown; 12 segments, the fifth with a stem one-third the length of the cylindric basal enlargement, which latter has a length about three times its diameter; terminal segment produced, tapering to a narrowly rounded apex and with a length over four times its diameter. Palpi; the first segment greatly produced, curved, irregular, slender; the second with a length three times its diameter, the third one-half longer than the second, the fourth a little longer than the third. Mesonotum light brown, the submedian lines pale orange.

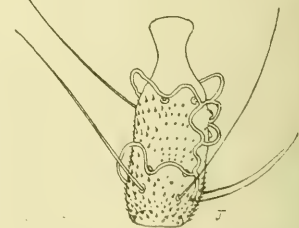


Fig. 38 *Holoneurus humilis*; fifth antennal segment of female, enlarged (original)

Scutellum, postscutellum and abdomen pale orange. Wings hyaline, slender, costa light brown, the third vein at the apex, the simple fifth close to the posterior margin. Halteres semitransparent, slightly fuscous apically. Legs light brown, distal tarsal segments slightly darker; claws rather long, strongly curved, slightly swollen subapically, unidentate; pulvilli rudimentary. Ovipositor short, terminal lobe narrowly oval. Type Cecid. 658.

Holoneurus occidentalis Felt

1911 Felt, E. P. N. Y. Ent. Soc. Jour., 19: 190-91

This species was reared from a dead, partly decayed wild fig branch collected at Paraiso, Panama, by Mr E. A. Schwarz in connection with the biological survey of the isthmus under the auspices of the United States National Museum.

Holoneurus elongatus Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 420

A male, studied through the courtesy of the United States National Museum, was taken July 2d by Dr H. G. Dyar at Kaslo, B. C.

Male. Length 2 mm. Antennae one-half longer than the body; sparsely haired, light fuscous; 16 segments, the fifth with a stem twice the length of the cylindric basal enlargement, which latter has a length about two and one-half times its diameter, terminal

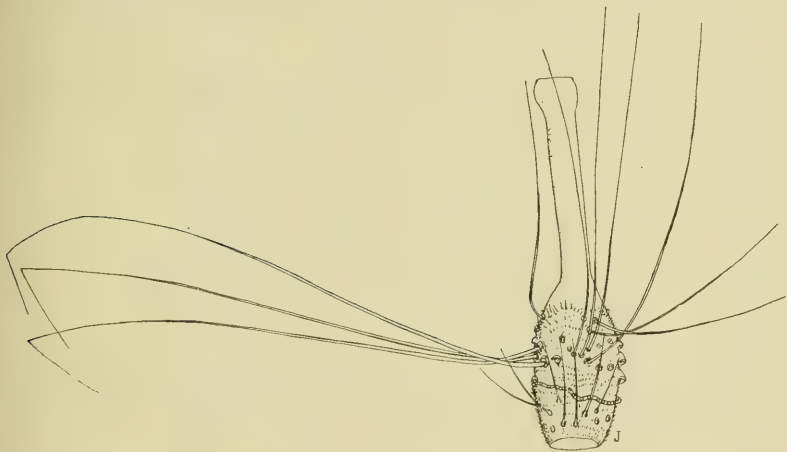


Fig. 39 *Holoneurus elongatus*; fifth antennal segment of male, the indistinct distal circumfilum is not represented, enlarged (original)

segment somewhat reduced, with a length three times its diameter and tapering to a narrowly rounded apex. Palpi extremely long, the first segment with a length five times its diameter, the second one-half as long as the first, the third nearly twice the length of the

second and the fourth twice as long as the third. Mesonotum reddish brown. Scutellum and abdomen light yellowish brown, the latter reddish brown apically. Wings hyaline, costa yellowish. Halteres yellowish transparent. Legs fuscous yellowish, the tarsi lighter; claws long, evenly curved, unidentate, the pulvilli shorter than the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment stout, greatly swollen, with a slender tooth apically; dorsal plate long, deeply and narrowly incised, the lobes narrowly rounded, ventral plate deeply and roundly emarginate, the lobes narrowly rounded. Harpes apparently modified to form slender, recurved, chitinous hooks. Type Cecid. 954.

Holoneurus tarsalis n. sp.

The yellowish male was reared August 15, 1910 from pine needles and other debris collected at the base of a large, white pine, *Pinus strobus*, recently defoliated by the pine sawfly, *Lophyrus abbotii* Leach, at North Creek, N. Y.

Male. Length 1.5 mm. Antennae one-half longer than the body, sparsely haired, fuscous brown, yellowish basally, the stems light brown; 16 segments, the fifth with a stem one-half longer than the basal enlargement, which latter has a length about twice its diameter, terminal segment reduced, with a length three times its diameter, narrowly rounded apically; mouth parts deep orange. Palpi yellowish, the first and second segments presumably quadrate, the third with a length about four times its diameter, the fourth with a length nearly twice the third. Mesonotum dark brown, the submedian lines yellowish, sparsely haired. Scutellum reddish orange, post-scutellum and abdomen yellowish, the latter with an orange tint basally and on the sixth and seventh segments; genitalia fuscous yellowish. Costa pale straw. Halteres yellowish basally, fuscous subapically, orange apically. Coxae pale yellowish; femora, tibiae and tarsi a nearly uniform fuscous straw, the fourth and the fifth segment basally, and the posterior tarsi mostly yellowish white. Claws long, evenly curved, unidentate, the pulvilli as long as the claws. Genitalia; basal clasp segment short, stout, obliquely truncate; terminal clasp segment short, greatly swollen, with a slender tooth apically; dorsal plate long, deeply, broadly and roundly emarginate, the lobes narrowly rounded; ventral plate long, broadly and roundly emarginate, the lobes narrowly rounded. Harpes rather long, approximate, irregularly toothed; style short, slender. Type Cecid. a2060.

Holoneurus multinodus Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 420

The midge was taken July 7, 1906 in a trap lantern at Nassau; N. Y.

Male. Length 3 mm. Antennae longer than the body, sparsely haired, fuscous yellowish, yellowish basally; 25 segments, the fifth

with a stem one-fourth longer than the cylindric basal enlargement, which latter has a length one-fourth greater than its diameter; terminal segment produced, with a length about four times its diameter and tapering to a narrowly rounded apex. Palpi short, the first segment irregularly subquadrate, the second with a length about twice its diameter, the third one-half longer, slender, the fourth a little longer than the third. Face yellowish. Mesonotum light brown, submedian lines narrow, yellow, the posterior median area yellow. Scutellum pale carmine with a few setae apically, postscutellum and abdomen a nearly uniform dull yellowish. Wings hyaline, costa light brown. Halteres yellowish transparent. Legs pale yellowish, the distal segments of the posterior tarsi slightly fuscous; claws slender, evenly curved, unidentate, the pulvilli rudimentary. Genitalia; basal clasp segment rather long, stout; terminal clasp segment short, greatly swollen, recurved; dorsal plate short, broad, broadly emarginate; ventral plate rather long, deeply and narrowly emarginate, the lobes narrowly rounded. Harpes apparently modified to form recurved, chitinous hooks. (Plate 7, figure 1). Type *Cecid.* 528.

Holoneurus photophilus Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 148 (separate, p. 52) (*Asynapta*)

1908 ——— N. Y. State Mus. Bul. 124, p. 421 (*Asynapta*)

One midge was taken June 3, 1906 in a trap lantern at Nassau, N. Y.

Male. Length 2 mm. Antennae one-fourth longer than the body, sparsely haired, light brown, annulate with yellow; 28 segments,

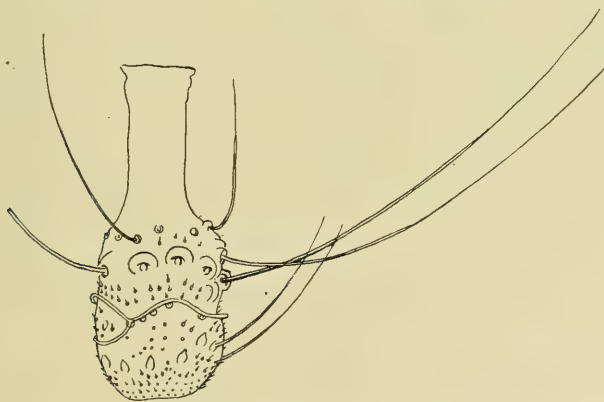


Fig. 40 *Holoneurus photophilus*; fifth antennal segment of male, enlarged (original)

the fifth with a smooth stem one-fourth longer than the subcylindric basal enlargement, which latter has a length twice its diameter;

terminal segment slightly pro oged, irregularly subconic, the apex narrowly rounded. Palpi; the first segment rather long, subquadrate, second much swollen at the basal third, irregular, the third nearly twice the length of the second and the fourth a little longer than the third. Face yellowish. Mesonotum reddish brown with distinct lighter submedian lines ornamented with yellowish hairs, posterior median area yellowish. Scutellum reddish brown with sparse apical hairs, postscutellum and abdomen a slightly variable reddish brown. Wings hyaline, costa pale yellowish brown. Halteres yellowish transparent basally, carmine apically. Legs long, a nearly uniform pale straw color; claws probably simple. Genitalia; basal clasp segment stout, tapering; terminal clasp segment large, strongly curved, excavated internally, with a conspicuous apical spur. Dorsal plate broad, broadly emarginate, ventral plate apparently represented by a pair of widely separated, strongly curved, truncate lobes. Harpes short, stout, strongly chitinized, fused basally, curving from the median line, distally broadly rounded and with a heavily chitinized apex; style long, slender, strongly curved. (Plate 7, figure 3). Type *Cecid.* 119.

OLIGOTROPHIARIAE

Members of this tribe may be distinguished by the third vein being well separated from the anterior margin, the rather short, cylindric antennal segments, usually stemmed in the male and the simple claws, or with the claws at most minutely toothed. This group comprises a large number of mostly good sized, usually reddish or reddish brown species. There is a marked tendency toward reduction in the number of palpal segments, this being particularly evident in the large genus *Rhopalomyia*, a natural group displaying a marked fondness for the tender tissues of leaf and flower buds. There is a great variation in the number of antennal segments, there being a range of from 12 to 26 in both *Phytophaga* and *Rhopalomyia*. Owing to variations in antennal, palpal, alar and other structures, it is very difficult to establish the genera satisfactorily. Two European genera, *Mikiola* Kieff. and *Psectroscema* Kieff., and the Brazilian *Uleia* Rubs. are so insufficiently described or present so little modification that we have been unable to give satisfactory diagnostic characters for their separation from American genera. The genus *Mikiola* Kieff. is evidently closely allied to the larger forms of *Phytophaga* Rond. As understood by us we are unable to find satisfactory characters for the separation of the two. It is admitted that our present grouping of species under *Phytophaga*, *Oligotrophus* and *Janetiella* is not entirely satisfactory, though we question the wisdom

of further revision prior to obtaining more reared material in order that both sexes may be represented by good series.

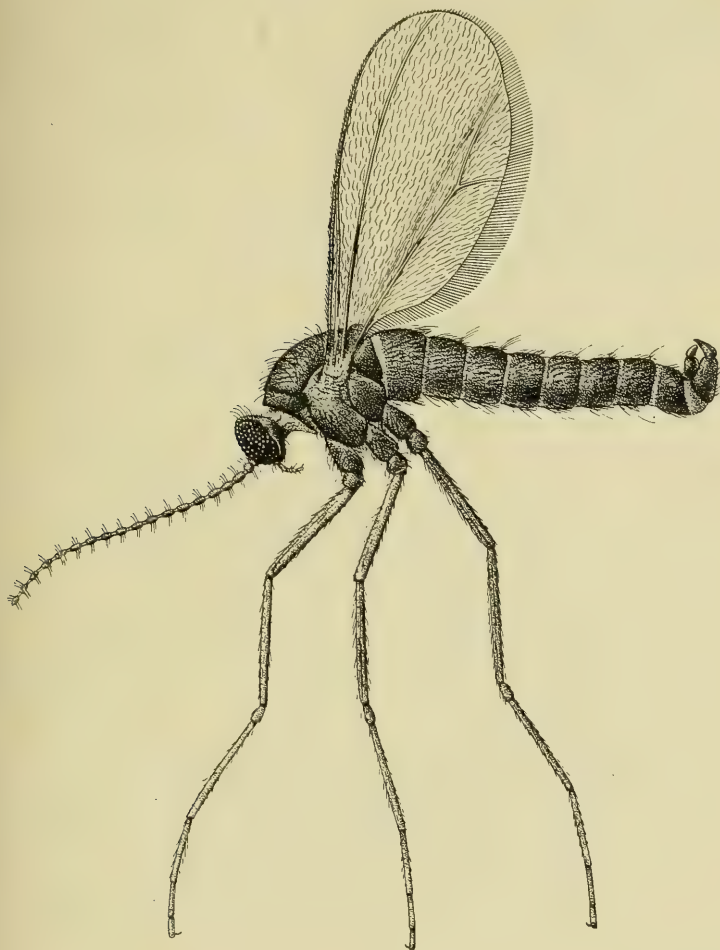


Fig. 41 *Phytophaga destructor*; lateral view of adult, enlarged (original)

Key to American genera

- a* Palpi quadriarticulate
- b* Third vein uniting with costa at or beyond the apex of the wing; claws simple or feebly dentate; antennal segments 11 to 20 or more
 - Phytophaga* Rond
- bb* Third vein uniting with costa well before the apex of the wing; antennal segments 12 to 16.....*Janetiella* Kieff

aa Palpi uni-, bi-, or triarticulate

b Ovipositor distinctly chitinated, short, the terminal portion cultriform; antennal segments 12 to 21.....*Sackenomyia* Felt

bb Ovipositor fleshy, short or moderately long

c Palpi triarticulate; terminal clasp segment moderately slender; antennal segments 13 to 16.....*Oligotrophus* Latr.

cc Palpi uni- or biarticulate

d Ovipositor of the female fleshy, at least moderately long, not enlarged, the terminal lobes rather short and stout, the terminal clasp segment of the male short, stout, fusiform.....*Rhopalomyia* Rubs.

dd Ovipositor of female short, triangular, the terminal clasp segment of the male distinctly produced, not fusiform.. *Walshomyia* Felt

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1846 ——— Sci. Nat. Bologna Nouv. Ann., ser. 2, p. 371, 374

1856 ——— Dipt. Ital. Prodr., 1: 200

1861 ——— Soc. Ital. Sci. Nat. Milano Atti, vol. 2, separate, p. 4

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1896 ——— Wien. Ent. Zeit., 15: 89 (Mayetiola)

1897 ——— Syn. Cecid. Eur. & Alg., p. 24 (Mayetiola)

1897 **Marchal, Paul.** Soc. Ent. Fr. Ann., 66: 62-63

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

1910 **Rubsaamen, E. H.** Zeitschr. Wissenschaft. Insektenbiol., 15: 336

1910 ——— Zeitschr. Wissenschaft. Insektenbiol., 15: 204 (Poomyia)

1911 **Felt, E. P.** N. Y. Ent. Soc. Jour., 19: 45

1913 **Kieffer, J. J.** Gen. Insect., fasc. 152, p. 66

The genus is of particular interest, since it includes the exceedingly injurious wheat pest known as the Hessian fly, *P. destructor* Say, and treated of in most economic literature under the generic name of *Cecidomyia* or *Mayetiola*. The species referable to this genus may be recognized by the third vein uniting with costa at or beyond the apex, in connection with the quadriarticulate palpi and the simple or feebly dentate claws. We have provisionally allowed this genus to remain in the *Oligotrophariæ*, a tribe characterized in part by simple claws.

The genus *Phytophaga* was erected by Rondani in 1840, in a paper, which according to information kindly supplied by Dr Mario Bezzi of Italy, was published separately. There was no designation of a type species until 1856, when Rondani cites *Phytophaga cerealis* Rond., this being a synonym of *P. destructor* Say.

Key to species

- a* 11 to 15 antennal segments
 - b* 11 antennal segments
 - c* Abdomen and the antennae with its sessile segments fuscous yellowish
caudata n. sp., C. 1381
 - b* 12 antennal segments
 - c* Abdomen yellowish; antennae light brown, the segments subsessile, the second and third tarsal segments more or less dilated; male
azaleae Felt, C. 48
 - bb* 13 sessile or subsessile antennal segments
 - c* Abdomen and antennae dark brown; male.....aceris Felt, C. 66a
 - cc* Abdomen reddish brown, the fifth antennal segment with a length one-half greater than its diameter; ovipositor one-fourth the length of the body; female.....virginiana Felt, C. 80
 - ccc* Abdomen reddish brown, the fifth antennal segment with a length twice its diameter; ovipositor as long as the body; female
balsamifera Felt, C. 146
 - bbb* 14 antennal segments
 - c* Posterior tarsi normal
 - d* Antennal segments sessile
 - e* Abdomen reddish brown, the fifth antennal segment with a length twice its diameter, the fourth palpal segment one-half longer than the third; ovipositor one-fifth the length of the abdomen
electra Felt, C. 50b
 - ee* Abdomen bright red, the fifth antennal segment with a length two and one-half times its diameter, the fourth palpal segment a little longer than the third; ovipositor as long as the body, female; reared from elm buds and folded leaves
ulmi Beutm., C. 1239, a1683
 - dd* Antennal segments subsessile, the fifth with a stem one-fourth or one-third the length of the basal enlargement
 - e* Third vein uniting with costa well beyond the apex
 - f* Abdomen pale yellowish, the fifth antennal segment with a stem one-fourth the length of the basal enlargement; male
thalictri Felt, C. 98
 - ee* Third vein uniting with costa just beyond the apex
 - f* Abdomen bright red; ovipositor short; female
socialis Felt, C. 97
 - ff* Abdomen yellowish or fuscous yellowish; ventral plate of the male deeply and roundly emarginate distally; the female with the ovipositor as long as the body; reared from rolled violet leaves
violicola Coq., C. a1346
 - fff* Abdomen yellowish; ventral plate of the male deeply and triangularly incised; female with ovipositor as long as the body; reared from ash leaves.....fraxini n. sp., C. a1841
 - ddd* Antennal segments plainly stemmed, the fifth with a stem as long as the basal enlargement
 - e* Abdomen reddish orange; ventral plate broadly and roundly emarginate; reared from partly folded elm leaves....ulmi Beutm., a1683

- cc* Second to fourth segments of the posterior tarsi greatly enlarged; abdomen pale yellowish, greenish dorsally; third vein uniting with costa just beyond the apex; antennae dark brown, the fifth segment with a stem one-half the length of the basal enlargement; male

latipes Felt, C. 511

bbbb 15 antennal segments

- c* Abdomen dark reddish; antennae dark reddish brown, the fifth segment with a stem one-fourth the length of the basal enlargement; male; reared from spruce bud gall. *tsugae* Felt, C. 165

- cc* Abdomen yellowish brown; fifth antennal segment with a length two and one-half times its diameter. *latipennis* Felt, C. 782

aa 16 to 19 antennal segments

b 16 antennal segments

- c* Antennal segments sessile, the fifth with a length two and one-half times its diameter; ovipositor one-half the length of the abdomen

- d* Abdomen reddish brown, the body slender, the lobes of the ovipositor with a length twice their width; reared from slender willow twigs; female. *caulicola* Felt, C. ar822a

- dd* Abdomen dark brown, the body stout, the lobes of the ovipositor with a length three and one-half times their width; reared from subglobose galls on slender willow twigs. *tumidosae* Felt, C. 1300

- cc* Antennal segments with more or less of a stem

- d* Fifth antennal segment with a stem one-fourth the length of the basal enlargement, which latter has a length twice its diameter; abdomen yellowish brown; third and fourth palpal segments equal; reared from Ribes; female. *californica* Felt, C. 919

- dd* Fifth antennal segment with a stem one-third the length of the basal enlargement; abdomen dark brown; reared from slender willow twigs; male. *caulicola* Felt, ar822a

- ddd* Fifth antennal segment with a stem one-half the length of the basal enlargement; abdomen yellowish brown; reared from Ribes; male. *californica* Felt, C. 919

- dddd* Fifth antennal segment with a stem three-fourths the length of the basal enlargement; abdomen yellowish brown; reared from willow. *latipennis* Felt, C. 782

bb 17 antennal segments

- c* Fifth antennal segment with a stem three-fourths the length of the basal enlargement; abdomen dark brown; reared from willow; male

americana Felt, C. 920

bbb 18 antennal segments

- c* Fifth antennal segment with a stem three-fourths the length of the basal enlargement

- d* Abdomen reddish brown; reared from wheat stems; male

destructor Say, C. 771, 772

bbbb 19 antennal segments

- c* Abdomen reddish brown; fifth antennal segment with a length three times its diameter; ovipositor one-fourth the length of the abdomen, the lobe with a length twice its width; reared from wheat stems; female

destructor Say, C. 771

- cc Abdomen dark brown; fifth antennal segment with a length one-half greater than its diameter; ovipositor one-half the length of the abdomen, the lobe with a length three times its width; reared from willow; female.....americana Felt, C. 920
- aaa 20 or more antennal segments
- b Antennal segments sessile
- c Abdomen reddish; 24 to 26 antennal segments, the fifth with a length one-half greater than its diameter; the ovipositor one-fourth the length of the abdomen, the lobe with a length one-half greater than its width; reared from apical beak gall on willow; female...rigidae O. S., C. a687
- cc Abdomen light brown; 26 antennal segments, the fifth with a length two and one-half times its diameter; the ovipositor one-third the length of the abdomen, the lobes with a length only three-fourths the width; reared from a small clustered rosette willow gall; female
walshii Felt, C. 774, 924, a1813
- ccc Abdomen reddish brown; 24 antennal segments, the fifth with a length two and one-half times its diameter; the ovipositor as long as the body, the lobe with a length four times its width; reared from Celtis leaves; female.....celtiphyllia Felt, C. 913, 918
- bb Antennal segments with a distinct stem
- c Fifth antennal segment with a stem one-half the length of the basal enlargement
- d Abdomen reddish brown; 24 antennal segments; reared from a beak gall on willow; male.....rigidae O. S., C. a687
- cc Fifth antennal segment with a stem three-fourths the length of the basal enlargement
- d Abdomen dark brown; 20 antennal segments; reared from Salix stems; male.....perocculta Ckll., C. 1251
- dd Abdomen pale yellowish; 25 to 26 antennal segments; reared from a small clustered rosette willow gall; male...walshii Felt, C. 774
- ccc Fifth antennal segment with a stem as long as the basal enlargement
- d Abdomen reddish brown; 22 to 23 antennal segments; reared from Celtis leaves; male.....celtiphyllia Felt, C. 913, 918

Phytophaga caudata n. sp.

The fuscous yellowish species described below was taken at Albany, N. Y., May 9, 1910 on wild geranium, *Geranium maculatum*. The insects appeared to be pairing, though males only were secured. Nothing is known concerning the life history of this form.

Male. Length 1.5 mm. Antennae hardly extending to the base of the abdomen, sparsely haired, fuscous yellowish, the distal segment variably tinted with reddish; 11 sessile segments, the fifth with a length about one-third greater than its diameter; distal segment produced, with a length over twice its diameter, narrowly rounded apically. Palpi; first segment irregularly ovoid, the second narrowly oval, with a length about twice its width, the third one-half longer than the second, somewhat dilated, the fourth as long as the second, more slender. Mesonotum dark brown, the sub-

median lines sparsely haired. Scutellum reddish brown; post-scutellum yellowish. Abdomen sparsely haired, fuscous yellowish; genitalia yellowish, fuscous apically. Wings narrow, costa pale straw, the third vein uniting therewith at the apex. Halteres yellowish basally, a variable reddish apically. Coxae reddish brown. Legs a variable fuscous yellowish, the distal tarsal segments reddish brown; claws moderately stout, evenly curved, the pulvilli as long as the caws. Genitalia; basal clasp segment short, stout, terminal clasp segment short, tapering; dorsal plate short, deeply and triangularly emarginate, ventral plate moderately long, broad, broadly rounded. Type Cecid. 1381.

Phytophaga azaleae Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 122 (separate, p. 26) (Oligotrophus)

1908 ——— N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

The yellowish midge was taken on azalea at Albany, N. Y., May 18, 1906.

Male. Length 1.5 mm. Antennae not extending to the base of the abdomen, sparsely haired, light brown; 12 segments, the fifth and following subsessile, slightly swollen near the middle; terminal segment short, reduced, subovoid. Palpi; the first segment short, stout, broadly rounded, the second a little longer, similar, the third and fourth each slender and about twice the length of the second; face dark brown. Mesonotum dark brown with submedian lines of dark hairs. Scutellum reddish brown, postscutellum lighter, abdomen yellowish, genitalia dark brown. Wings hyaline, costa tinged with red, the third vein just beyond the apex. Halteres and coxae yellowish transparent. Femora and tibiae yellowish brown, tarsi brown, tinged with reddish, the second and third tarsal segments dilated; claws stout, slightly curved. Genitalia; basal clasp segment short, stout; terminal clasp segment short, broad at base; dorsal plate short broad, deeply emarginate; ventral plate broad, rounded, tapering, broadly emarginate. Type Cecid. 48.

Phytophaga aceris Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 122 (separate, p. 26) (Oligotrophus)

1908 ——— N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

The dark brown male was taken at Albany, N. Y., on red maple, *Acer rubrum*, May 21, 1906.

Male. Length .75 mm. Antennae extending to the third abdominal segment, sparsely haired, dark brown; 13 sessile segments; terminal segment nearly double the length of the preceding, broadly rounded. Palpi; the first segment stout, the second one-half longer than the first, the third a little longer, more slender, the fourth

one-half longer than the third; face dark brown. Mesonotum dark brown with distinct submedian lines of yellowish hairs. Scutellum reddish brown, postscutellum yellowish. Abdomen dark brown, sparsely clothed with yellowish hairs. Wings hyaline, costa dark brown, the third vein a little before the apex. Halteres yellowish transparent. Legs reddish brown and yellowish, lighter ventrally, the femora apically, the tibiae and the distal tarsal segments darker; claws slender, uniformly curved. Genitalia; basal clasp segment stout, with a conspicuous fingerlike, slightly curved process arising from the basal third; terminal clasp segment swollen; dorsal plate broad, deeply and triangularly incised. Harpes slender, convolute, broadly rounded. Type Cecid. 66a.

Phytophaga balsamifera Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

This reddish brown female was taken on balsam, *Abies balsamifera*, at Lake Clear, N. Y., June 7, 1906.

Female. Length 1.5 mm. Antennae extending to the third abdominal segment, sparsely haired, dark brown; 13 sessile segments, the fifth with a length twice its diameter terminal segment nearly double the length of the preceding, broadly rounded. Palpi; the first segment suboval, the second about as long as the first, the third a little shorter, broader, the fourth a little shorter, broadly oval; face reddish brown. Mesonotum nearly uniform dark brown. Scutellum reddish brown. Abdomen rather bright red. Wings hyaline, costa dark brown, the third vein a little before the apex. Halteres yellowish red basally, the base of the club fuscous, the tip yellowish white. Legs nearly uniform straw brown, the articulations tinged with carmine; claws stout, uniformly curved. Ovipositor as long as the body, terminal lobes long, slender, narrowly rounded. Type Cecid. 146.

Phytophaga virginiana Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

The reddish brown female was taken on choke cherry, *Prunus virginiana*, at Albany, N. Y., May 23, 1906.

Female. Length 2 mm. Antennae extending to the base of the abdomen, sparsely haired, dark brown; 13 sessile segments, the fifth with a length one-half greater than its diameter; terminal segment much produced, more than twice the length of the preceding, slightly constricted at the basal third. Palpi; the first and second segments short, suboval, the third more slender, nearly twice the length of the preceding two, the fourth a little longer than the third. Mesonotum reddish brown, darker anteriorly, shining. Scutellum and postcutellum light reddish brown. Abdomen reddish brown, thinly clothed with hairs. Wings hyaline, costa light straw, the third vein just beyond the apex. Halteres

brownish. Legs pale at base, gradually darkening distally, tarsi light brown; claws slender, uniformly curved. Ovipositor short, about one-fourth the length of the body, terminal lobes short, stout, broadly rounded. Type Cecid. 80.

***Phytophaga ulmi* Beutm.**

1907 **Beutenmueller, William.** Amer. Mus. Nat. Hist. Bul. 23, p. 387 (Cecidomyia)

1908 **Jarvis, T. D.** Ent. Soc. Ont. 38th Rep't, p. 86 (Cecidomyia)

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

1909 **Jarvis, T. D.** Ent. Soc. Ont. 39th Rep't, p. 80 (Cecidomyia)

1912 **Felt, E. P.** N. Y. Ent. Soc. Jour., 20:240 (Male)

This bright-red species was reared from small terminal leaves or leaf buds of the American elm, *Ulmus americana*. It occurs about New York City, probably at Albany, N. Y., and has been reported by Jarvis as fairly common in Ontario, Canada.

Gall. This is produced by the folding and growing together of small, immature, terminal leaves or leaf buds, the adults appearing in June and July.

Female. Length 1.5 mm. Antennae extending to the third abdominal segment, sparsely haired, pale yellowish; 14 sessile segments, the fifth with a length about two and one-half times its diameter, tapering; terminal segment produced, narrowly oval, more or less fused with the preceding. Palpi; the first segment rather long, irregularly oval, the second short, stout, broadly oval, the third nearly twice the length of the second, more slender, the fourth a little longer and more slender than the third; face yellowish brown. Mesonotum light shining brown, the submedian lines sparsely haired. Scutellum yellowish brown, postscutellum fuscous yellowish. Abdomen very sparsely haired, light fuscous yellowish (in life bright red); terminal segment a little darker, the distal portion of the ovipositor pale yellowish. Wings hyaline, costa dark brown, the third vein just before the apex. Halteres yellowish basally, slightly fuscous apically. Coxae and base of femora pale yellowish, the femora distally and tibiae basally a variable brown or yellowish brown, the distal portion of tibiae and tarsi dark brown; claws long, slender, evenly curved; pulvilli shorter than the claws. Ovipositor about as long as the body, the terminal lobes short, broad, broadly rounded.



Fig. 42 *Phytophaga ulmi*; gall nearly natural size (original)

Described from a type specimen, Cecid. 1239, donated for study by Prof. William Beutenmueller.

***Phytophaga electra* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

This reddish brown species was taken on hazel, *Corylus americana*, at Albany, N. Y., May 18, 1906.

Female. Length 1.5 mm. Antennae extending to the base of the abdomen, sparsely haired, dark brown; 14 sessile segments, the fifth with a length twice its diameter; terminal segment somewhat produced, fusiform. Palpi; the first segment quadrate, the second a little longer than the first, tapering slightly distally, the third one-fourth longer than the second, slightly swollen at the distal fourth, the fourth one-third longer than the third, slightly swollen distally. Mesonotum dark brown, the submedian lines and posterior median area yellowish. Scutellum yellowish with numerous apical yellowish setae, postscutellum dark brown. Abdomen carmine red. Wings hyaline, costa reddish brown, the third vein well beyond the apex. Halteres and coxae yellowish transparent; femora and tibiae yellowish brown, tarsi darker; claws slender, strongly curved. Ovipositor short, the terminal lobes stout, broadly rounded. Type Cecid. 50b.

***Phytophaga thalictri* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 123 (separate, p. 27) (Oligotrophus)

1908 ————— N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

This pale yellowish form was taken on early meadow rue, *Thalictrum dioicum*, at Albany, N. Y., June 1, 1906.

Male. Length 1.5 mm. Antennae shorter than the body, sparsely haired, light brown, yellowish basally; 14 segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length two and one-half times its diameter; terminal segment stout, rounded, subconical apically. Palpi; first segment short, stout, swollen distally, the second irregularly quadrate, short, the third nearly twice the length of the second, obliquely truncate, the fourth more slender, a little longer than the third. Mesonotum light yellowish brown, the submedian lines paler. Scutellum, postscutellum and abdomen pale yellowish, the latter sparsely clothed with light hairs. Wings hyaline, costa light brown, the third vein beyond the apex. (Plate 17, figure 6). Halteres pale yellowish transparent. Coxae and basal portion of femora pale yellowish, the remainder of legs fuscous yellow; claws long, slender, evenly curved. Genitalia; basal clasp segment stout, obliquely

truncate; terminal clasp segment stout; dorsal plate short, broad, deeply incised; ventral plate deeply and triangularly emarginate. Type Cecid. 98.

Phytophaga socialis Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

This bright reddish species was taken on early meadow rue, *Thalictrum dioicum*, at Albany, N. Y., June 1, 1906.

Female. Length 1 mm. Antennae shorter than the body, sparsely haired, dark brown, yellowish basally; 14 segments, the fifth with a stem one-third the length of the basal enlargement, which latter has a length twice its diameter; terminal segment subcylindric. Palpi; the second segment prolonged, slender, the third and fourth subequal, one-third longer than the second. Face yellowish. Mesonotum dark brown. Scutellum reddish brown, postscutellum lighter. Abdomen bright reddish. Wings hyaline, costa light brown, the third vein well beyond the apex. Halteres yellowish transparent. Legs nearly uniform pale brown; tarsi a little darker; claws slender, uniformly curved. Ovipositor short, the terminal lobes broad at base, tapering, broadly rounded. Type Cecid. 97.

Phytophaga violicola Coq.

Violet gall midge

1899 **Coquillett, D. W.** U. S. Dep't Agric., Div. Ent. Bul. 22, n.s. p. 48-51 (Diplosis)

1901 **Chittenden, F. H.** U. S. Dep't Agric., Div. Ent. Bul. 27, n.s. p. 47-50 (Diplosis)

1904 **Washburn, F. L.** Minn. Agric. Exp't Sta. Bul. 88, p. 189-90 (Diplosis)

1905 **Washburn, F. L.** Minn. Agric. Exp't Sta. Bul. 93, p. 65 (Diplosis)

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 59-61 (Contarinia)

1907 ——— U. S. Dep't Agric., Bur. Ent. Bul. 67, p. 41-42 (Contarinia)

1908 ——— N. Y. State Mus. Bul. 124, p. 369 (Mayetiola)

1909 ——— Ent. Soc. Ont. 39th Rep't, p. 43 (Contarinia)

This small, yellowish species is a serious pest in some violet houses, reducing the crop from one-third to one-half and causing a considerable loss in the aggregate. It is a local species, since one-half of a house 150 feet long may be seriously injured, while the other portion is almost exempt. The midges very rarely leave the plants and can be discovered only by flushing them with the hand. In infested houses none were to be found on the windows, in cobwebs or even in sheds at the ends of the houses. The first signs of injury are seen in the curling of the young violet leaves, caused by the yellowish maggots. This may be so rapid that leaves perfectly straight one day may be badly curled the next.

Larva. Length 2 mm, pale yellowish, rather slender. Head small, antennae long, tapering; breastbone bidentate, the shaft slender. Skin smooth; posterior extremity broadly rounded.

Male. Length 1.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, fuscous yellowish or dark brown, fourteen segments, the fifth with a stem about one-third the length of the basal enlargement, which latter has a length twice its diameter; terminal segment with the enlarged part produced, tapering, obtuse. Palpi; the first segment slightly subglobose, the second greatly enlarged, pyriform, the third slender, one-half longer than the second, slightly swollen at the basal third, the fourth one-half longer than the third, more slender. Face and mouth-parts fuscous yellowish. Mesonotum dark brown, almost black, the submedian lines sparsely clothed with yellowish setae. Scutellum fuscous yellowish, postscutellum dark brown mesially. Abdomen yellowish or fuscous yellowish, the segments margined posteriorly with fuscous in darker individuals. Wings hyaline, costa dark brown, the third vein beyond the apex, (Plate 17, figure 5)

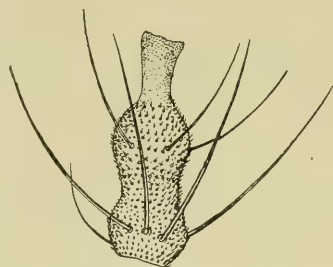


Fig. 43 *Phytophaga violicola*; sixth antennal segment of male, enlarged (original)



Fig. 44 *Phytophaga violicola*; male palpus, enlarged (original)

halteres yellowish transparent; coxae, femora and tibiae mostly dark brown, tarsi a variable fuscous yellow. Claws long, slender, evenly curved. Genitalia; basal clasp segment short, stout; terminal clasp segment short, stout; dorsal plate short, broad, broadly and triangularly emarginate; ventral plate short, broad, deeply and roundly emarginate.

Female. Length 2 mm. Antennae extending to the fourth abdominal segment, sparsely haired, fuscous yellowish, fourteen segments, the fifth with a stem one-third the length of the basal enlargement; terminal segment hardly produced, obtusely rounded. Palpi; the first segment short, stout, subquadrate, the second one-half longer, somewhat enlarged, slightly swollen at the basal third, the third rather long, slender, slightly rounded, the fourth a little longer, somewhat flattened. Face and mouth-parts fuscous. Color characters about as in the opposite sex. Ovipositor a pale salmon, probably longer than the body, the terminal lobes long, slender, acutely rounded.

***Phytophaga fraxini* n. sp.**

This yellowish midge was reared June 22d from the leaf petioles of ash, *Fraxinus*, taken at Poughkeepsie, N. Y., June 9, 1908. Infested shoots were collected at Albany, N. Y., June 13, 1913.

Gall. Numerous pale yellowish larvae were observed at the base of the terminal leaf petioles. They prevent the normal development of the central, leading bud. There was no noticeable deformity.

Larva. Length 1.5 mm, pale yellowish. Head long, slender; antennae rather short, tapering; breastbone bidentate, teeth broadly rounded, the shaft rather slender. Skin finely shagreened; posterior extremity broadly rounded.

Male. Length 2 mm. Antennae nearly as long as the body, sparsely haired, fuscous yellowish, the basal segments yellowish; 14 segments, the fifth with a stem about one-fourth the length of the basal enlargement, which latter has a length about three and one-third times its diameter; terminal segment rather stout, with a length about three times its diameter and bearing apically a rather long, stout, fingerlike process. Palpi; the first segment short, stout, subquadrate, the second with a length about three times its diameter, the third a little longer and more dilated and the fourth as long as the third. Face yellowish. Mesonotum light brown, the submedian lines yellowish, sparsely haired. Scutellum yellowish orange, postscutellum, abdomen and genitalia yellowish. Wings hyaline, costa light brown, the third vein well beyond the apex; halteres yellowish transparent. Coxae and femora basally yellowish, the distal portion of femora and tibiae light fuscous yellowish, tarsi mostly dark brown; claws long, slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout; dorsal plate short, stout, deeply and triangularly emarginate; ventral plate long, deeply and triangularly incised.

Female. Length 2.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, fuscous yellowish, basally yellowish; 14 segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length three times its diameter; terminal segment produced, with a length five times its diameter, apically a pyriform appendage. Palpi; the first segment short, stout, subquadrate, the second rather stout, with a length nearly three times its diameter, the third one-half longer than the second, more slender and the fourth one-half longer than the third, more dilated. Color practically as in the male, except that the mesonotum is slightly darker and the setae on the abdomen more evident. The wings are slightly more hairy. Legs and claws practically as in the opposite sex. Ovipositor about as long as the body, slender, the terminal lobes long, tapering, narrowly rounded. Type Cecid. a1841.

Phytophaga tsugae Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 123 (separate, p. 27)
(Mayetiola)

1908 ————— N. Y. State Mus. Bul. 124, p. 370 (Mayetiola)

This dark reddish male was taken on hemlock, *Tsugacandensis*, at Lake Clear, N. Y., June 7, 1906. The adult was reared from spruce bud galls by J. M. Swaine from material collected near Ottawa, Que., in 1914.

Male. Length 1.5 mm. Antennae extending to the middle of the abdomen, thickly haired, dark reddish brown; 15 segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment slightly prolonged, subfusiform. Palpi; the first segment irregular, swollen distally, the second subpyriform, the third broadly oval, the fourth one-half longer than the third, subcylindric, broadly rounded apically; face dark reddish brown. Mesonotum dark brown. Scutellum, postscutellum and abdomen dark reddish. Wings hyaline, costa reddish brown, the third vein just before the apex; halteres whitish transparent. Legs pale straw, lighter ventrally, tarsi darker; claws short, stout, uniformly curved, the pulvilli very large, twice the length of the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, greatly swollen; dorsal plate broad, deeply and narrowly incised. Type Cecid. 165.

Female. Length 2 mm. Antennae extending to the fourth abdominal segment, dark brown; 14 segments, the fifth sessile, with a length twice its diameter and tapering basally and apically. Palpi quadriarticulate, the segments short, the fourth with a length one-fourth greater than the third. Mesonotum shining dark brown. Scutellum and postscutellum reddish brown. Abdomen sparsely haired, fuscous yellowish, the ovipositor pale orange; halteres yellowish basally, fuscous apically. Wings hyaline, femora and coxae fuscous yellowish, the tibiae darker, the tarsi almost dark brown. The ovipositor three-fourths the length of the abdomen, the terminal lobes roundly tapering. Cecid. a2515.

Phytophaga latipes Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 370 (Mayetiola)

This pale yellowish midge was taken on New Jersey tea, *Ceanothus americanus*, at Albany, N. Y., July 6, 1906.

Male. Length 1 mm. Antennae a little shorter than the body, sparsely haired, dark brown, yellowish basally; 14 segments, the fifth with a stem one-half the length of the subcylindric basal enlargement, which latter has a length two and one-half times its diameter; terminal segment produced, the basal enlargement cylindric, with a length three times its diameter, apically a long, fingerlike appendage.

Palpi; the first segment stout, subquadrate, the second one-half longer, broad, the third as long as the second, slender, the fourth one-half longer and more slender than the third. Face yellowish. Mesonotum olive green, the submedian lines indistinct. Scutellum pale yellowish green, postscutellum darker. Abdomen pale yellowish, slightly greenish dorsally. Wings long, narrow, hyaline, costa light brown, the third vein just beyond the apex; Halteres pale yellowish, fuscous subapically. Legs a nearly uniform fuscous straw, the posterior

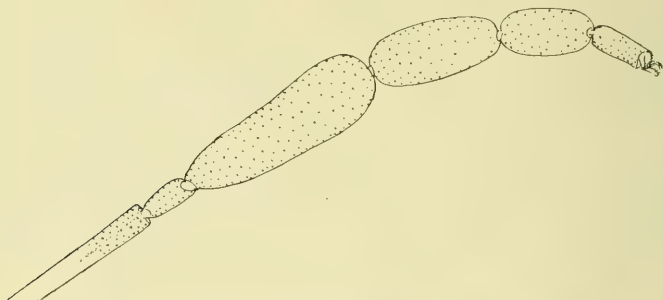


Fig. 45 *Phytophaga latipes*; posterior tarsus, enlarged (original)

tarsi with the second, third and fourth segments greatly dilated, the second with a length four times its diameter, the third with a length three times its diameter, the fourth a little shorter, more slender. Claws long, slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment long, stout, swollen basally; dorsal plate long, broad, broadly and roundly emarginate; ventral plate long, broad, broadly and roundly emarginate.

This form is peculiar in that the male antennae are almost identical in structure with those of certain female Diplosids. The wings are unusually long and narrow, the genitalia peculiar, while the most striking feature is the great dilation of certain segments of the posterior tarsi. Type Cecid. 511.

***Phytophaga caulicola* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 370 (Mayetiola)

This reddish brown species was reared in some numbers from slender willow, *Salix*, twigs April 27, 1908 taken by Mr L. H. Weld at Evanston, Ill. The rather slender, orange larvae occur in long, oval cells in the pith or just beneath the bark about 1 mm in diameter and 3 to 5 mm long. This species was reared from the same twigs as *Rhabdophaga caulicola*.

Gall. The gall is indicated externally by very little or no swelling. Five to six or more larvae may occur in a portion of a willow stem 2 to 3 mm in diameter and 10 cm long.

Larva. Length 3 mm, dark orange. Head small; antennae long, tapering; breastbone bidentate, with a minute, median tooth, the shaft broad, heavily chitinized. Skin coarsely shagreened; posterior extremity broadly rounded.

Male. Length 1.75 mm. Antennae extending to the fourth abdominal segment, sparsely haired, dark brown; 16 segments, the fifth with a stem one-third the length of the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, with a length thrice its diameter, tapering, rounded apically. Palpi; first segment short, stout, the second with a length twice its diameter, narrowly oval, the third one-third longer, more slender, the fourth a little longer and more slender than the third. Mesonotum dark brown, the submedian lines thickly haired. Scutellum dark brown, postscutellum fuscous yellowish. Abdomen dark reddish brown, sparsely haired. Genitalia dark brown. Wings hyaline, costa yellowish, the third vein just before the apex. Halteres fuscous, reddish apically. Legs tinged with reddish and thickly clothed with silvery scales. Genitalia; basal clasp segment long, broad; terminal clasp segment long, stout; dorsal plate long, broad, deeply and triangularly incised; ventral plate long, broad, deeply and roundly emarginate. Harpes short, stout, truncate, with an irregular, quadrate tooth apically.

Female. Length 3 mm. Antennae extending to the third abdominal segment, sparsely haired, light brown, yellowish basally; 16 segments, the fifth with a length two and one-half times its diameter; terminal segment produced, with a length four times its diameter, constricted near the distal third. Palpi; first segment short, stout, irregular, the second with a length nearly three times its diameter, narrowly oval, the third one-half longer, more slender, the fourth a little longer and more slender than the third. Face fuscous yellowish. Mesonotum reddish brown, the submedian lines thickly haired. Scutellum reddish orange, postscutellum orange. Abdomen reddish brown; membrane and pleurae deep orange. Ovipositor fuscous yellowish. Halteres light fuscous yellowish. Coxae and base of femora fuscous yellowish; femora distally, tibiae and tarsi dark brown, the latter almost black; claws rather short, stout, strongly curved, the pulvilli longer than the claws. Ovipositor about half the length of the abdomen, stout, the terminal lobes narrowly oval. Type Cecid. ar822a.

Phytophaga tumidosae Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 370 (Mayetiola)

This dark brown species was reared from a subglobular gall on willow, *Salix*, April 11, 1908. It was taken by Mr L. H. Weld at Evanston, Ill.

Gall. Diameter, 4 mm subglobular, inhabited by a dark orange larva invariably occurring just below the bud. The bark covering the deformity is more or less ruptured and scarred. The infested

twigs are only 2 mm in diameter. Species of *Polygnotus*, *Eurytoma* and *Decatoma* were reared from this gall.

Larva. Length 2 mm, dark orange, rather stout. Head small; breastbone bidentate, somewhat expanded subapically, the shaft long, rather slender, heavily chitinized. Skin coarsely shagreened; posterior extremity irregularly rounded.

Female. Length 3 mm. Antennae extending to the second abdominal segment, sparsely haired, reddish brown; 16 sessile segments, the fifth with a length nearly three times its diameter; terminal segment reduced, subconic. Palpi; first segment subquadrate, the second broadly oval, the third a little longer, more slender, the fourth longer and more slender. Mesonotum dark slaty brown, submedian lines thickly haired. Scutellum, post-scutellum and abdomen dark brown, the segments of the latter margined posteriorly with yellowish setae; membrane and pleurae reddish brown, the ventral sclerites dark brown. Wings hyaline, costa dark brown. Coxae, femora and tibiae fuscous yellowish; tarsi dark brown; claws long, stout, strongly curved, the pulvilli longer than the claws. Ovipositor one-half the length of the abdomen, the terminal lobes with a length three times the width, narrowly rounded. Type Cecid. 1300.

***Phytophaga californica* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 370 (Mayetiola)

The yellowish brown species characterized below was reared from currant, *Ribes menziesii*, taken in February in Alameda county, California.

Male. Length 2.5 mm. Antennae nearly as long as the body, sparsely haired, light brown; 16 segments, the fifth with a stem one-third the length of the basal enlargement, which latter has a length two and one-half times its diameter; terminal segment reduced, narrowly oval. Palpi; first segment produced, swollen distally, second roundly rectangular, the third more than twice the length of the second, slender, the fourth nearly as long as the third, slender. Mesonotum yellowish brown, the submedian lines sparsely haired. Scutellum and postscutellum reddish brown. Abdomen sparsely haired, dark reddish brown; genitalia fuscous. Wings hyaline, costa pale straw. Halteres whitish basally, fuscous yellowish apically. Coxae and femora pale yellowish, the tibiae and tarsi a little darker; claws long, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment stout; terminal clasp segment short, swollen; dorsal plate broad, triangularly emarginate; ventral plate long, deeply and broadly incised. Harpes stout, broadly rounded.

Female. Length 2.5 mm. Antennae extending to the second abdominal segment, sparsely haired, pale yellowish; 16 segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length nearly three times its diameter; terminal

segment narrowly oval, with a length nearly three times its diameter. Ovipositor about half the length of the abdomen; terminal lobes small, narrowly oval. Type Cecid. 919.

***Phytophaga latipennis* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 353 (Rhabdophaga)

Several specimens of this yellowish brown species were reared from inconspicuous, knotted galls on willow, probably the glaucous willow, presumably in the spring of 1905 or 1906 by Dr James G. Needham, then of Lake Forest, Ill.

Gall. This is an inconspicuous, knotted growth on willow.

Male. Length 2 mm. Antennae a little shorter than the body; 16 segments, the fifth with a stem three-fourths as long as the basal enlargement, which latter has a length twice its diameter; terminal segment slender, greatly produced, with a length four times its diameter. Palpi; first segment irregularly subquadrate, the second subrectangular, with a length three times its diameter, the third and fourth subequal, each about one-half longer than the second. Wings hyaline, the posterior margin distinctly produced to form a rather broadly rounded lobe. Genitalia; basal clasp segment long, stout; terminal clasp segment long, stout at base; dorsal plate long, broad, triangularly incised; ventral plate long, broad, broadly and angularly emarginate. Harpes stout, broadly rounded, with several irregular, conspicuous, chitinous processes. Color and other characters presumably nearly as in the female.

Female. Length 4 mm. Antennae extending to the fourth abdominal segment, sparsely haired, light brown; 15 segments, the fifth with a length two and one-half times its diameter, the terminal segment greatly produced, evidently composed of two closely fused. Palpi; nearly as in the male, except that the subequal third and fourth segments are relatively shorter. Mesonotum fuscous brown, the submedian lines indistinct. Scutellum fuscous, post-scutellum probably the same. Abdomen yellowish brown. Wings hyaline, the third vein uniting with the margin a little before the apex, the anal angle less produced than in the male. Halteres yellowish basally, slightly fuscous apically. Legs a variable fuscous yellowish; claws stout, strongly curved, simple, the pulvilli nearly as long as the claws. Ovipositor about one-half the length of the abdomen, the terminal lobes with a length three times the width, narrowly rounded. Type Cecid. 782.

***Phytophaga americana* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 370, 371 (Mayetiola)

This species was reared in some numbers from a very elongate, slender, swelling on willow twigs, *Salix*, received at the Bureau of Entomology, Washington, D. C., in May 1889 from O. S. Westcott of Maywood, Ill.

Gall. A very elongate, slender swelling of the twig, tapering at both ends.

Male. Length 1.5 mm. Antennae nearly as long as the body, thickly haired, yellowish brown; 17 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, tapering, acute. Palpi; first segment short, subquadrate, the second quadrate, with a length one-half greater than its diameter, the third a little longer, more slender, the fourth one-half longer than the third, more slender. Mesonotum dark brown, the submedian lines thickly haired. Scutellum yellowish brown, darker basally, postscutellum yellowish brown. Abdomen sparsely clothed with silvery hairs, dark brown (dark red in life). Genitalia fuscous yellowish. Wings hyaline, costa pale straw. Halteres yellowish basally, fuscous apically. Coxae, femora and tibiae pale yellowish, the tarsi slightly darker; claws long, slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, truncate; terminal clasp segment long, tapering; dorsal plate broad, deeply and triangularly incised; ventral plate short, deeply and roundly emarginate. Harpes long, stout, obliquely truncate.

Female. Length 2 mm. Antennae extending to the second abdominal segment, sparsely haired, fuscous yellowish; probably 17 segments, the fifth subsessile, with a length two and one-half times its diameter; subbasal whorl thick, short, subapical band rather scattering, relatively short. Ovipositor about one-half the length of the abdomen, the terminal lobe with a length three times its width, broadly rounded. Type Cecid. 920.

***Phytophaga destructor* Say¹**

Hessian fly

1817 **Say, Thomas.** Acad. Nat. Sci. Jour., 1: 45-48; same republished in Le Conte Say's Complete writings, 2: 4-6, 1883 (Cecidomyia)

1847 **Fitch, Asa.** N. Y. State Agric. Soc. Trans., 6: 316-73 (same, separate date 1847, p. 3-60, Cecidomyia)

1883 **Packard, A. S.** U. S. Ent. Com. 3d Rep't, 1883, p. 198-248 (Cecidomyia)

1897 **Marchal, Paul.** Soc. Ent. de Fr. Ann., 66: 1-42, 43-47, 51-62, 80-100 (Mayetiola)

1898 **Osborn, Herbert.** U. S. Dep't Agric. Div. Ent. Bul. 16, n. s., p. 1-57 (Mayetiola)

1902 **Felt, E. P.** N. Y. State Mus. Bul. 53; Rep't for 1901, p. 705-30 (Mayetiola)

1909 **Hayhurst, Paul.** Econ. Ent. Jour., 2: 231-34 (Mayetiola)

The Hessian fly is one of the best known representatives of the gall midges, owing to the fact that it lives in an important cereal

¹ An extended economic bibliography is purposely omitted since so much of it is a repetition of well-known citations. The later publications cited below have extensive bibliographies.

and its ravages compel the attention of all. The popular name was bestowed in the belief that it was brought into this country in packing or straw shipped to the Hessian soldiers then stationed on Long Island. There is a strong probability that this is true, though it can never be proved beyond question.

An economic discussion of this species is unnecessary here and we have given therefore only technical descriptions of both sexes.

Male. Length 2 mm. Antennae one-fourth longer than the body, rather thickly haired, light brown; 18 to 20 segments, the fifth with a stem three-fourths the length of the cylindric basal enlargement, which latter has a length two and one-half times its diameter, terminal segment reduced, narrowly oval. Palpi; first segment irregularly obconic, the second subquadrate, the third one-third longer, more slender, the fourth about twice the length of the third. Abdomen reddish brown. Mesonotum shining dark brown, the submedian lines indistinct, the posterior median area a variable yellowish. Scutellum fuscous yellowish, postscutellum fuscous. Abdomen reddish brown, with a narrow, broken submedian line, incisures and pleurae whitish. Wings hyaline, costa light brown, the third vein at or just beyond the apex. Halteres yellowish basally, fuscous apically. Legs a variable fuscous yellowish; claws long, slender, evenly curved, minutely unidentate, the pulvilli longer than the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment long, stout; dorsal plate broad, deeply and triangularly emarginate, the lobes narrowly rounded; ventral plate short, broad, deeply and triangularly emarginate, the lobes rather long, broad, narrowly rounded. Harpes long, broadly rounded, with an irregular group of unusually long, subquadrate, chitinous spines. (Plate 18, figure 1).

Female. Length 3 mm. Antennae extending to the fourth abdominal segment, sparsely haired, light brown; 17-19 subsessile segments, the fifth with a length about two and one-half times its diameter; terminal segment slightly reduced, narrowly rounded apically. Palpi; first segment irregularly obconic, the second narrowly oval, the third a little longer, more slender, the fourth about twice the length of the third. Mesonotum dark brown, the submedian lines indistinct. Scutellum and postscutellum dark brown. Abdomen reddish brown, the incisures and pleurae yellowish red. Wings hyaline, costa dark brown, venation as in the opposite sex. Halteres pale yellowish. Legs fuscous yellowish; claws stout, evenly curved, simple, the pulvilli longer than the claws. Ovipositor short, stout, the terminal lobes short, broadly rounded.

***Phytophaga rigidae* O. S.**

1845 **Fitch, Asa.** Am. Quar. Jour. Agric. & Sci., 1:263-69 (*Cecidomyia salicis*)

1862 **Osten Sacken, C. R.** Mon. Dipt. N. A., 1:189 (*Cecidomyia*)

- 1864 Walsh, B. D. Ent. Soc. Phila. Proc., 3:590-91 (*Cecidomyia cornu*); 591-95 (*Cecidomyia siliqua*); 595-98 (*Cecidomyia*)
- 1867 ——— Ent. Soc. Phila. Proc., 6:224-25 (*C. siliqua*)
- 1870 Riley, C. V. Amer. Ent., 2:214 (*Cecidomyia*)
- 1874 Glover, Townend. Notes from My Journal (*Cecidomyia*)
- 1885 Riley, C. V. Bul. 5, U. S. Dep't Agric., Bur. Ent., p. 16 (*Encyrtus cecidomyiae* Riley parasite of, *Cecidomyia*)
- 1890 Cockerell, T. D. A. Entomologist, p. 278-79
- 1892 Beutenmueller, William. Bul. Amer. Mus. Nat. Hist., 4:268 (*Cecidomyia*)
- 1895 Baker, C. F. Ent. News 6:173 (Ft. Collins, Col., *Cecidomyia siliqua*)
- 1903 Cook, M. T. Ohio Univ. Bul., ser. 7, no. 20, p. 422 (*Cecidomyia*)
- 1904 Beutenmueller, William. Amer. Mus. Nat. Hist. Guide Leaflet no. 16, p. 29 (*Cecidomyia*)
- 1904 Cook, M. T. Dep't Geol. & Nat. Res. Ind., 29th Rep't, p. 840 (*C. siliqua*)
- 1906 Felt, E. P. Ins. Affect. Prk. & Wldd. Trees, N. Y. State Mus. Mem. 8, v. 2, p. 745 (*Rhabdophaga siliqua*)
- 1906 ——— N. Y. State Mus. Bul. 104, p. 122-25 (*Rhabdophaga*)
- 1906 Cockerell, T. D. A. Ent. News, 17:398 (*Rhabdophaga*)
- 1907 Jarvis, T. D. 37th Rep't Ent. Soc. Ont., p. 68 (*Cecidomyia*)
- 1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 371 (*Mayetiola*)
- 1909 Brodie, William. Can. Ent., 41:251-52 (*Rhabdophaga siliqua* = *R. rigidae* O. S.)
- 1909 Felt, E. P. Ent. Soc. Ont., 39th Rep't, p. 45 (*Mayetiola*)
- 1909 Jarvis, T. D. Ent. Soc. Ont., 39th Rep't, p. 92 (*Mayetiola*)
- 1910 Cook, M. T. Mich. Geol. & Biol. Surv. Pub. 1, Biol. Ser. 1, p. 31 (*Cecidomyia*)
- 1910 Stebbins, F. A. Springf. Mus. Nat. Hist. Bul. 2, p. 5, 7, 10 (*Mayetiola*)

The gall produced by this species on willow is very characteristic, relatively common in New York State at least and appears to be widely distributed, having been received from Aweme, Manitoba, Logan, Utah and St Louis, Mo., not to mention its somewhat general occurrence in the eastern states. The adults appear in the latitude of Albany during the early part of May. The species winters as reddish larvae in the galls. There is but one generation annually. The reddish brown males may be recognized by the 24 antennal segments, the fifth with a stem one-half the length of the basal enlargement. The female has 24-26 sessile segments, the fifth with a length one-half greater than its diameter. The wing is illustrated on plate 17, figure 2.

This midge was originally described by Fitch in the American Quarterly Journal of Agriculture and Science, as *Cecidomyia salicis*. Later, Osten Sacken proposed this specific name for the preoccupied *salicis*. This species was apparently redescribed by Walsh as *Cecidomyia siliqua*. Kertész, in 1902, makes

both *salicis* Fitch and *rigidae* O. S. synonyms of the Walsh species. The preceding, we do not believe, can be justified by the rules of priority. *Torymus ostensackenii* D. T. was reared from this midge.

Gall. This is an apical or subapical deformity, fusiform in shape, about an inch long and tipped with a rather characteristic, slender, curved beak. (Plate 10, figure 2). Galls producing parasites only are almost invariably smaller and usually vary somewhat from the normal.

***Phytophaga walshii* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 371 (Mayetiola)

This species was reared at Lake Michigan Beach, Ill., on spongy or clustered galls on dwarf willow, by Prof. James G. Needham, presumably in the spring of 1906.

Gall. This is described by Professor Needham simply as a spongy or clustered gall on dwarf willow, possibly only a variety of *Phytophaga strobiloides* Walsh. (Plate 12, figure 1).

Larva. Stout, 5 mm long, yellowish or yellowish white, broadly rounded. Head small; antennae short, tapering; breastbone bidentate, the points diverging, the shaft rudimentary. Skin coarsely shagreened; posterior extremity broadly rounded.

Male. Length 4 mm. Antennae extending to the sixth abdominal segment, very thickly haired, light brown; 25-26 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, slender. Palpi; first segment narrowly oval, second a little broader, third one-third longer than the second, slender, the fourth about as long as the third. Mesonotum reddish brown. Scutellum yellowish brown, postscutellum fuscous. Abdomen pale yellowish. Wings; costa yellowish brown. Halteres yellowish white, fuscous subapically. Legs a variable brown; claws long, slender, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, swollen basally; dorsal plate long, deeply and triangularly emarginate, ventral plate long, deeply and triangularly emarginate. Harpes short, stout, truncate.

Female. Length 5 mm. Antennae extending to the second abdominal segment, sparsely haired, light brown; 26 sessile segments, the fifth with a length two and one-half times its diameter; terminal segment broadly fused with the preceding. Mesonotum reddish brown. Scutellum yellowish brown, postscutellum fuscous. Abdomen pale yellowish. Pulvilli a little longer than the claws. Ovipositor about half the length of the abdomen, the terminal lobes short, broadly rounded. Type Cecid. 774.

Phytophaga celtiphyllia Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 371 (Mayetiola)

The reddish brown species described below was reared in May 1900 from obconic leaf galls on leaves of hackberry, *Celtis*, taken by Mr J. M. Shaffer at Keokuk, Iowa, and sent to the Division of Entomology, United States Department of Agriculture. Apparently the same form was reared by Mr Pergande from similar galls on young twigs of hackberry collected by E. A. Schwarz at Corpus Christi, Texas, in 1895.

Gall. Very hard, obconic, the upper extremity produced as a long, slender nipple; at the base five or six low ridges. The galls are smooth inside and divided by a delicate though dense web into two compartments, the larva occurring in the lower. The galls occur on the upper side of the leaf and drop when mature. (Notes by Pergande)

Larva. Pale yellowish, with a brown breastbone. (Notes by Pergande)

Male. Length 3 mm. Antennae nearly as long as the body, sparsely haired, light brown; 22 to 23 segments, the fifth with a stem as long as the basal enlargement, which latter has a length twice its diameter; terminal segment reduced, tapering, obtuse. Palpi; first segment short, stout, irregular, the second rather stout, with a length twice its diameter, the third a little longer and stouter, the fourth apparently missing. Mesonotum shining dark brown, the submedian lines thickly clothed with fulvous hairs. Scutellum yellowish brown, sparsely setose apically, postscutellum fuscous yellowish. Abdomen reddish brown. Wings hyaline, costa light brown, the third vein at the apex. Halteres yellowish basally, reddish brown apically. Legs a variable reddish brown, the segments darker apically; claws long, slender, evenly curved, the pulvilli a little shorter. Genitalia; basal clasp segment long, stout; terminal clasp segment long, swollen near the middle; dorsal plate long, broad, broadly and triangularly incised; ventral plate short, broad, deeply and roundly incised. Harpes short, stout, obliquely truncate.

Female. Length 3.5 mm. Antennae extending to the fifth abdominal segment, sparsely haired, reddish brown; 24 segments, the fifth cylindric, with a length two and one-half times its diameter; terminal segment produced, broadly rounded. Palpi; first segment short, stout, irregularly oval, the second one-half longer, stout, the third twice the length of the second, more slender, the fourth one-fourth longer than the third, somewhat dilated. Ovipositor probably as long as the body, the terminal lobes slender, with a length about four times the diameter, tapering, narrowly rounded. Other characters practically as in the male. Type Cecid. 913.

Phytophaga perocculta Ckll.

1904 Cockerell, T. D. A. Canad. Ent., 36:156 (Cecidomyia)

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 371 (Mayetiola)

Examples of this form were received from Prof. T. D. A. Cockerell, labeled Colorado Springs, April 21st. The specimens were reared from the stems of willow, *Salix*.

Male. Length 2 mm. Antennae about as long as the body, dark brown, thickly long-haired; 20 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length one-third greater than its diameter; terminal segment produced, tapering, narrowly rounded. Palpi; the first segment rather long, expanded distally, the second a little longer, roundly subquadrate, the third as long as the second, more slender, the fourth one-third longer than the third, slender. Mesonotum dark brown, the submedian lines thickly clothed with very long hairs, they having a length equal to more than two-thirds the width of the mesonotum. Scutellum dark brown, postscutellum a little darker. Abdomen very dark brown and thickly clothed with long, fuscous hairs, the latter having a length about equal to the diameter of the abdomen; genitalia fuscous. Wings hyaline, costa light brown, the third vein uniting with the anterior margin just before the apex. Halteres yellowish basally, fuscous apically. Legs a variable fuscous yellowish, the extremities of the segments usually darker, the posterior tarsi a lighter fuscous yellowish; claws long, stout, strongly curved distally, the pulvilli a little longer than the claws. Genitalia; basal clasp segment short, very stout; terminal clasp segment short, stout, greatly swollen; dorsal plate short, broad, deeply and triangularly emarginate; ventral plate long, narrow, broadly and roundly emarginate. Harpes short, stout, tapering, irregularly oblique, with several subquadrate tubercles.

Described from the dried type specimens kindly donated by Prof. T. D. A. Cockerell. Type Cecid. 1251.

Janetiella Kieff.

1897 Kieffer, J. J. Syn. Cecid. Eur. & Alg., p. 23

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 371

1910 Rubsaamen, E. H. Zeitsch. Wissenschaft. Insektenbiol., 15:336

1911 Felt, E. P. N. Y. Ent. Soc. Jour., 19:46

1913 Kieffer, J. J. Gen. Insect., fasc. 152, p. 58

This genus, when erected, was separated from *Oliogotrophus* by the elongate, quadriarticulate palpi, and from *Phytophaga* by the third vein uniting with the anterior margin of the wing and not extending to its apex. The first species named, *J. thymi* Kieff., we take as the type of the genus. This species, according to its describer, has 14 antennal segments in both sexes, the middle flagellate segment in the male having a stem with a length equal to the ovate basal enlargement, which latter is provided with two whorls of hairs. The ses-

Male. Length .75 mm. Antennae hardly extending to the base of the abdomen, sparsely haired, dark brown; 12 segments, the fifth sub sessile; terminal segment slightly produced, obtuse distally. Palpi; the first and second segments short, subquadrate, the third about the length of the two preceding, slender, the fourth a little longer and more slender than the third. Face reddish brown. Mesonotum dark brown, the submedian lines thickly clothed with brownish hairs. Scutellum reddish brown, postscutellum dark brown. Abdomen light brown with a yellowish cast laterally. Wings hyaline, costa light brown. Halteres pale reddish basally, yellowish white apically. Legs pale brown, lighter ventrally; tarsi a little darker; claws slender, uniformly curved. Genitalia; basal clasp segment stout, basally, a long, quadrate internal lobe; terminal clasp segment stout; dorsal plate broad, deeply and broadly emarginate; ventral plate broad, deeply and roundly emarginate. Type Cecid. 83.

***Janetiella brevicornis* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 122 (separate, p. 25-26) (Oligotrophus)

1908 ————— N. Y. State Mus. Bul. 124, p. 372

This fuscous yellowish species was taken on *Solidago* at Nassau, N. Y., June 14, 1906.

Male. Length 1 mm. Antennae extending to the base of the abdomen, rather thickly haired, dark brown, yellowish basally; 12 segments, the fifth with a length a little greater than its diameter; terminal segment slightly prolonged, ovoid. Palpi; the first segment short, subquadrate, the second twice the length of the preceding, narrowly oval, the third one-half longer, much more slender, slightly dilated subapically, the terminal segment about as long as the preceding, slightly broader; face pale yellowish. Mesonotum dark brown with submedian lines yellowish, sparsely ornamented with fine setae. Scutellum reddish orange, postscutellum dark brown. Abdomen nearly uniform fuscous yellowish, genitalia somewhat fuscous. Wings hyaline, costa dark brown; halteres whitish transparent basally, yellowish apically. Legs nearly uniform pale straw, the distal segments dark brown; claws rather slender, uniformly curved. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout, slightly swollen at the basal third; dorsal plate broad, deeply and triangularly emarginate; ventral plate narrow, deeply and roundly emarginate. Harpes short, stout, irregularly tuberculate, truncate. Type Cecid. 281.

***Janetiella sanguinea* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 372

The reddish female described below has 12 sub sessile antennal segments and a rather short ovipositor. It was taken in the vicinity of wild cherry, *Prunus serotina*, at Nassau, N. Y., May 15, 1906.

Female. Length 1.5 mm. Antennae extending to the base of the abdomen, sparsely haired, dark brown; 12 segments, the fifth sessile, one-half longer than the diameter; terminal segment subconical. Palpi; the first segment rounded, short, stout, the second twice the length of the first, somewhat rounded, the third a little longer than the second, more slender, the fourth one-half longer than the third, more slender. Head and mesonotum black. Scutellum red, postscutellum dark brown. Abdomen red, sparsely clothed with blackish hairs. Wings subhyaline, unspotted, costa dark brown, rather thickly clothed basally with narrow scales; halteres yellowish transparent. Legs yellowish brown, tarsi reddish brown; claws stout, strongly curved. Ovipositor short, the terminal lobes somewhat stout, broadly rounded. Type Cecid. 17.

Janetiella ligni n. sp.

The small, reddish female described below was reared May 8, 1911 from decaying chestnut bark collected at Nassau, N. Y., and infested by various Dipterous larvae, including *Winnertzia pectinata* Felt. This form presents a superficial resemblance to *Miastor*.

Female. Length 1.25 mm. Antennae very short, dark brown, reddish brown basally; 12 sessile segments, the third and fourth rather closely fused, the fifth subcylindric, tapering distally, with a length about three-fourths its diameter and low, broad circumfili at the basal third and subapically suggesting those of *Lasioptera*; terminal segment narrowly oval. Palpi; first segment narrowly oval, with a length nearly twice its diameter, the second subquadrate, with a length about one-fourth greater than its diameter, the third and fourth subequal, each with a length nearly twice that of the third and dilated apically. Mesonotum dark brown. Scutellum reddish, postscutellum and abdomen orange red. Ovipositor yellowish. Wings hyaline. Halteres reddish. Coxae reddish; femora and tibiae fuscous straw, the tarsi slightly darker. Ovipositor nearly as long as the abdomen, the terminal lobes with a length nearly three times the width, narrowly rounded. Type Cecid. a2109w.

Janetiella nodosa Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 123 (separate, p. 27)

1908 ————— N. Y. State Mus. Bul. 124, p. 372

The male was taken in the vicinity of pine and around hornbeam, *Carpinus caroliniana*, at Albany, N. Y., April 28, 1906.

Male. Length 1.25 mm. Antennae extending to the middle of the abdomen, sparsely haired, dark brown; 14 segments, the fifth with a stem one-third the length of the stout basal enlargement. Palpi; the first segment short, the second a little longer than the first, swollen basally, the third more slender, one-half longer than the second, the fourth one-fourth longer than the third. Face and

mesonotum dark brown. Abdomen reddish brown, incisures orange brown. Wings hyaline, larger veins brown. Halteres yellowish transparent. Legs yellow with reddish tints. Tibiae apically, and tarsi fuscous; claws stout, slightly curved. Genitalia; basal clasp segment very broad; terminal clasp segment slightly swollen basally; dorsal plate broad, deeply incised; ventral plate broad, deeply and roundly emarginate. Harpes broadly rounded. (Plate 17, figure 7.) Type Cecid. 10.

Janetiella americana Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 372

The fuscous yellowish male was taken on willow, *Salix*, at Albany, N. Y., July 17, 1906.

Male. Length 2 mm. Antennae as long as the body, sparsely haired, light brown, yellowish basally; 14 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length twice its diameter; terminal segment slightly produced, tapering. Palpi; first segment orbicular, second with a length three times its width, the third one-third longer than the second, more slender, the fourth longer and more slender than the third. Face fuscous yellowish. Mesonotum dark brown, the submedian lines indistinct. Scutellum fuscous yellowish, postscutellum deep red. Abdomen sparsely haired, dull fuscous yellowish; genitalia brown. Costa dark brown. Halteres whitish basally, reddish fuscous apically. Legs a nearly uniform pale straw, the tarsi variably tinged with carmine. Claws slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment short, stout, terminal clasp segment short, swollen basally; dorsal plate short, broad, broadly and angularly emarginate; ventral plate short, deeply and roundly emarginate. Harpes long, slender, minutely dentate. Type Cecid. 616.

Janetiella coloradensis Felt

1912 Felt, E. P. N. Y. Ent. Soc. Jour., 20:148-49

This species was reared from oval swellings at the base of pine needles by Prof. E. Bethel, Denver, Col.

Janetiella asplenifolia Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 159-60

1908 ——— N. Y. State Mus. Bul. 124, p. 372

This species was collected and reared by the late Dr M. T. Thompson of Worcester, Mass., from a fleshy fold or lamina near the mid-vein on the leaves of sweet fern, *Myrica asplenifolia*. This gall was also taken by Miss Cora H. Clarke at Magnolia, Mass., July 27, 1908.



Fig. 46 *Janetiella asplenifolia*; gall on sweet fern leaves, nearly natural size (original)

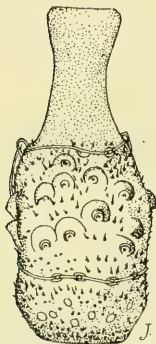


Fig. 47 *Janetiella asplenifolia*; fifth antennal segment of male, enlarged (original)

Gall. Length 2 to 4 mm, shining and often reddish. It is a fleshy fold near the midvein, frequently producing curling or even recurving of the leaf. (Plate 9, figure 3.) One or more larvae inhabit the deformity.

Male. Length 2 mm. Antennae nearly as long as the body, sparsely haired, light fuscous yellowish; 15 segments, the fifth with a stem about three-fourths the length of the basal enlargement, which latter has a length about one-half greater than its diameter; the terminal segment produced, narrowly oval. Palpi; the first segment short, stout, subquadrate, second a little longer, more slender, the third one-half longer than the second and the fourth longer and more slender than the third. Mesonotum dark brown, the narrow submedian lines and posterior median area yellowish. Scutellum and postscutellum fuscous yellowish. Abdomen a deep orange yellow, the distal segments paler, the

incisures and pleurae pale salmon, genitalia fuscous yellowish. Wings hyaline, costa light brown. Halteres yellowish transparent. Legs



Fig. 48 *Janetiella asplenifolia*; fifth antennal segment and claw of female, enlarged (original)

pale yellowish, the femora dorsally blackish, tibiae and tarsi progressively more fuscous apically; claws long, slender, strongly curved, the

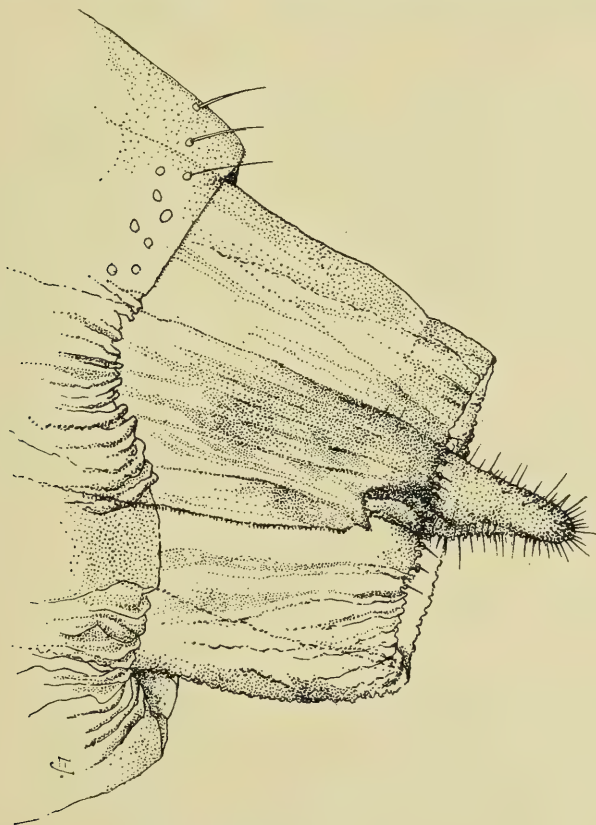


Fig. 49 *Janetiella asplenifolia*; lateral view of the tip of the abdomen showing a portion of the long ovipositor, enlarged (original)

pulvilli as long as the claws. Genitalia; basal clasp segment long, stout, broadly rounded; terminal clasp segment long, slender, swollen near the middle; dorsal plate broad, deeply and triangularly incised; ventral plate long, deeply and broadly incised.

Female. Length 1.75 mm. Antennae sparsely haired, pale yellowish; presumably 15 segments, the fifth subsessile, with a length about twice the diameter; claws rather long, stout, evenly curved, the pulvilli a little longer than the claws. Ovipositor probably two-thirds the length of the abdomen, the terminal lobes long. Otherwise nearly as in the male. Type *Cecid.* 1103.

***Janetiella acerifolia* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 124 (separate, p. 27) (*Oligotrophus*)

1908 ————— N. Y. State Mus. Bul. 124, p. 372

This dark brown species was taken at Albany, N. Y., May 17, 1906 along a hedge row containing maple, elm, shadbush and other plants.

Male. Length 1.5 mm. Antennae probably nearly as long as the body, sparsely long-haired, dark brown; 15 segments, the fifth with a stem one-half longer than the basal enlargement; terminal segment subconical, apex broadly rounded. Palpi; the first segment obpyriform, the second a little longer, subrectangular, the third one-half longer than the fourth, strongly flattened and the fourth about as long as the third. Mesonotum dark brown. Scutellum and postscutellum reddish brown, basal abdominal segment dark brown, other segments reddish, spotted with carmine; genitalia dark brown. Wings hyaline, costa dark brown; halteres yellowish transparent at base, slightly fuscous apically, very long. Legs a variable brown, lighter ventrally, tarsi slightly darker; claws slender, slightly curved. Genitalia; basal clasp segment stout; terminal clasp segment stout basally; dorsal plate broad, deeply incised; ventral plate narrow, deeply incised; harpes stout, tapering. Type *Cecid.* 35.

***Janetiella brevicauda* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 372

This reddish brown species was reared June 22, 1881 from the typical gall of *Lasioptera vitis* on grape, *Vitis*.

Female. Length 1.25 mm. Antennae extending to the base of the abdomen, sparsely haired, light yellowish; 15 segments, the fifth subsessile, with a length about one-fourth greater than its diameter; terminal segment reduced, narrowly rounded. Palpi; first segment subquadrate, the second with a length four times its diameter, the third a little shorter than the second, the fourth a little longer than the third. Face reddish yellow. Mesonotum reddish brown. Scutellum yellowish red, postscutellum a little

darker. Abdomen a variable reddish brown or salmon. Wings hyaline, costa dark brown. Halteres yellowish basally, fuscous apically. Legs a nearly uniform pale yellowish; claws slender strongly curved, the pulvilli nearly as long as the claws. Ovipositor short, terminal lobes with a length over twice the width, narrowly rounded. Type Cecid. 878.

Janetiella pini Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 124 (separate, p. 28)

1908 ——— N. Y. State Mus. Bul. 124, p. 372

This yellowish red male was taken on pine, *Pinus strobus*, at Albany, N. Y., May 26, 1906.

Male. Length 2.5 mm. Antennae longer than the body, dark brown, sparsely clothed with long, whitish hairs; 16 segments, the fifth with a stem one-fourth longer than the basal enlargement; terminal segment produced, subcylindric, rounded. Palpi; the first segment presumably short, the second a little longer than the first, the third one-half longer than the second, and the fourth one-fourth longer than the third. Mesonotum dark brown, reddish posteriorly. Scutellum and postscutellum reddish. Abdomen yellowish red. Wings hyaline, costa light brown. Halteres yellowish basally, reddish fuscous apically. Coxae pale yellowish; femora light brown distally, lighter ventrally; tibiae and tarsi light brown, the former darker distally; terminal tarsal segments somewhat darker; claws slender, slightly curved. Genitalia; basal clasp segment long; terminal clasp segment stout; dorsal plate broad, deeply incised; ventral plate narrow, deeply and roundly emarginate. Harpes broad at base, tapering, apically, a subquadrate tooth. Type Cecid. 87.

Janetiella parma Felt

1914 Felt, E. P. N. Y. Ent. Soc. Jour., 22:129-30

This yellowish midge was taken by C. P. Alexander in a bog swamp at Woodworth's lake in the Adirondacks, June 21, 1909.

Janetiella breviaria Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 372

This dark brown female was taken at Albany, N. Y., May 21, 1906.

Female. Length .75 mm. Antennae extending to the third abdominal segment, sparsely haired, dark brown; 16 subsessile segments, the fifth with a length one-half greater than its diameter; terminal segment produced, broadly rounded. Palpi; the first segment suborbicular, the second lanceolate, the third one-half longer than the second, and the fourth a little longer than the third. Mesonotum dark brown. Scutellum, postscutellum and abdomen

dark brown. Wings hyaline, costa light brown. Halteres brownish, fuscous basally, fuscous transparent distally. Legs dark brown, lighter ventrally. Ovipositor about one-fourth the length of the abdomen, the terminal lobes broad at base and broadly rounded. Type Cecid. 77.

OLIGOTROPHUS Latr.

- 1805 Latreille, P. A. Hist. Nat. Crust. et Ins., 14:288
- 1850 Loew, H. Dipt. Beitr., 4:20, 21 (Cecidomyia in part)
- 1877 Karsch, F. A. F. Revis. de Gallmucken, p. 16
- 1892 Rubsaamen, E. H. Berl. Ent. Zeitschr., 37:328, 376
- 1895 Kieffer, J. J. Wien Ent. Zeit., 14:10
- 1896 ———— Wien Ent. Zeit., 15:88, 89
- 1897 ———— Syn. Cecid. de Eur. & Alg., p. 22
- 1900 ———— Soc. Ent. Fr. Ann., 69:437
- 1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 368
- 1910 Rubsaamen, E. H. Zeitsch. Wissenschaft. Insektenbiol., 15: 336
- 1911 Felt, E. P. N. Y. Ent. Soc. Jour., 19:46
- 1913 Kieffer, J. J. Gen. Insect., fasc. 152, p. 49

The type species is *Tipula juniperina* Linn. According to Kieffer this species has triarticulate palpi, though Rubsaamen holds these organs to be quadriarticulate. This species, according to Schiner, has the third vein ending at the point of the wing, the male antennae shorter than the body, composed of 20 segments, the three basal joints sessile, the following with a stem shorter than the roundish basal enlargement, which latter is provided with three whorls of hairs. The female has shorter antennae, the flagellate segments with only a short stem. An examination of a specimen in the British Museum, identified by Winnertz as *Cecidomyia juniperiana* Linn., shows that it has the general appearance of *Phytophaga rigidae* O. S. The palpi are probably quadriarticulate.

Key to species

- a 13 or 14 antennal segments, abdomen dark brown
 - b 13 or 14 sessile antennal segments, the fifth having the basal enlargement with a length one-fourth greater than its diameter, the third palpal segment twice the length of the second; female; reared from Betula seeds.....*betulae* Winn., C. 964
 - bb 14 antennal segments
 - c Fifth antennal segment with a stem about one-fourth the length of the basal enlargement, which latter has a length twice its diameter; the third palpal segment three times the length of the second, female
vernalis Felt, C. 60

cc Fifth antennal segment of the male with a stem as long as the basal enlargement, that of the female cylindric, with a length two and one-half times its diameter, the third palpal segment shorter than the second; reared from an ovoid leaf gall on *Salix humilis*

salicifolius Felt, C. a2017

ccc Fifth antennal segment of the female sessile, with a length one-half greater than its diameter, the third palpal segment three-fourths the length of the second; reared from *Juniperus*

betheli Felt, C. a2303

aa 15 antennal segments

b Abdomen dark brown, the fifth antennal segment with a stem one-third the length of the basal enlargement; male; reared from *Betula* seeds

betulae Winn., C. 964

aaa 16 antennal segments

b Abdomen fuscous yellowish, the fifth antennal segment with a stem one-fourth longer than the basal enlargement; reared from apical rosette gall on *Solidago*.....in *quilinus* Felt, C. a1655a

***Oligotrophus betulae* Winn.**

1886 **Lintner, J. A.** State Ent. 3d Rep't, p. 85-86 (Cecidomyia)

1886 ———— Count. Gent., 51: 287 (Cecidomyia)

1888 ———— Inj. & Other Ins., 4th Rep't, p. 27 (parasites, Cecidomyia)

1892 **Theobald, F. V.** An Account of British Flies, p. 63

1896 **Lintner, J. A.** Inj. & Other Ins. N. Y., 11th Rep't, p. 162-65 (Cecidomyia)

1906 **Felt, E. P.** Ins. Affect. Prk. & Wldd. Trees, N. Y. State Mus. Mem. 8, 2: 621, 647

1908 ———— N. Y. State Mus. Bul. 124, p. 368

This insect was first observed in America in 1886, when deformed white birch catkins were submitted to Dr J. A. Lintner with an inquiry as to the cause of the abnormal condition. It has become established in Albany, the catkins of white birches in Washington Park in particular being rather badly infested in some seasons. This insect was so abundant in 1887 that about half of the catkins were affected. It was observed at New Haven, Conn., in 1902. The presence of this gall-maggot is easily detected, particularly after pupation, because of the windowlike spot rendering the insect visible beneath. The normal alate seed is transformed into a globose gall with rudimentary alae.

Life history. There is evidently but one generation annually, the larvae becoming full grown late in the fall, wintering in the affected galls, and the adults appearing in early spring. This species occurs in Europe on *Betula alba* and a Swedish variety of *B. pendula*, known as *B. valecardia*. European parasites are *Torymus pallidicornis* Boh. and *Leucopis*

griseola. Several species have been reared from American specimens and found to be different from the old world enemies.

Oligotrophus vernalis Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 368

The female was taken on basswood, *Tilia americana*, at Karner, N. Y., May 19, 1906.

Female. Length 1.5 mm. Antennae about as long as the body, sparsely haired, reddish brown; 14 segments, the fifth with a stem about one-fourth the length of the basal enlargement, which latter is distinctly rounded basally and apically; terminal segment slightly prolonged, subovoid, with a distinct subconical knob apically. Palpi; the first segment subquadrate, stout, the second suboval, a little longer than the first, the third longer than the preceding, rather stout. Mesonotum dark brown, submedian lines ornamented with setae. Scutellum yellowish, thickly clothed apically with dark setae, postscutellum yellowish, ferruginous. Abdomen dark brown, tinged with reddish. Wings hyaline, costa reddish brown; halteres reddish transparent. Coxae and femora yellowish red, tibiae and tarsi variable reddish brown and yellow; claws stout, uniformly curved. Ovipositor nearly as long as the abdomen, terminal lobe rather slender, narrowly rounded. Type Cecid. 606.

Oligotrophus salicifolius Felt

1910 Felt, E. P. Econ. Ent. Jour., 3: 354

The irregular, yellowish, red-spotted galls of this species on the leaves of *Salix humilis* were taken at Karner September 7, 1909, adults being reared in March and April of the following year. The deep orange larvae appear to desert the galls in late fall, spinning oval, yellowish cocoons attached to any hard substance such as a leaf. The gall is very similar to that of *O. capreae* Winn. and the adults are evidently closely allied though separable in color characteristics.

Gall. Length 2 to 3 mm, irregular, ovoid, monothalamous, yellowish, red-spotted and usually most evident on the under surface of the leaves of *Salix humilis*.

Larva. Length 1.75 mm, rather stout, deep orange. Head small; breastbone rudimentary or wanting; skin roughly shagreened; posterior extremity broadly rounded, slightly lobed.

Cocoon. Length 1.75 mm, white, narrowly oval, somewhat irregular and attached to a dead leaf.

Exuviae. Length 1.25 mm, whitish transparent; thoracic spines stout, slightly curved; antennal cases extending to the second

abdominal segment, the wing pads to the third and the leg cases to the fourth; posterior extremity broadly rounded.

Male. Length 2 mm. Antennae as long as the body, sparsely white-haired, yellowish brown; 14 segments, the fifth with a stem as long as the cylindric basal enlargement, which latter has a length

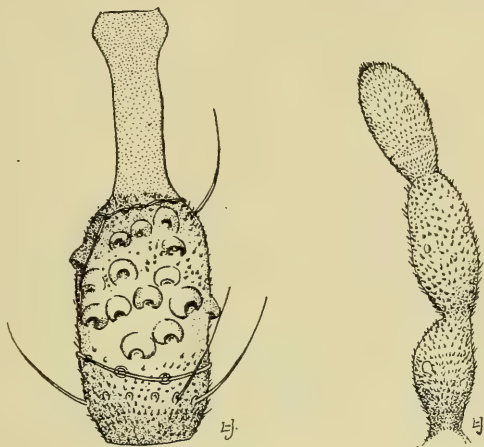


Fig. 50 *Oligotrophus salicifolius*; fifth antennal segment and palpus of male, enlarged (original)

twice its diameter; terminal segment reduced, narrowly rounded. Palpi; first segment narrowly oval, second one-half longer, slender, third a little shorter than the second. Mesonotum dark reddish, the median area dark brown, the submedian lines thickly haired. Scutellum reddish yellow, postscutellum fuscous. Abdomen sparsely haired, reddish yellow. Costa fuscous straw. Halteres long, yellowish basally, fuscous apically. Coxae fuscous yellowish; femora, tibiae and tarsi fuscous straw; claws slender, evenly curved, the pulvilli longer than the claws. Genitalia reddish brown; basal clasp segment stout; terminal clasp segment swollen, fuscous; dorsal plate long, triangularly emarginate; ventral plate broadly and roundly emarginate.

Female. Length 2.25 mm. Antennae extending to the base of the abdomen, sparsely haired, yellowish brown; 14 segments, the fifth with a length two and one-half times its diameter; terminal segment slightly reduced, tapering. Palpi nearly as in the male. Mesonotum dark reddish brown, submedian lines sparsely haired. Scutellum yellowish red, postscutellum reddish brown. Abdomen deep red. Costa fuscous straw. Halteres yellowish basally, fuscous apically. Coxae slaty brown, legs a variable fuscous straw. Ovipositor fuscous yellowish, as long as the abdomen; terminal lobe long, slender, tapering, narrowly rounded. Type Cecid. a2017.

Oligotrophus betheli Felt1912 **Felt, E. P.** N. Y. Ent. Soc. Jour., 20: 148

The midges were reared from a fleshy, apical gall on *Juniperus utahensis* collected by Professor Bethel at McCoy, Col.

Oligotrophus inquilineus Felt1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 368

1909 ———— Ottawa Nat., 22: 247

This fuscous yellowish male was reared September 11, 1907, from a large, terminal rosette gall on *Solidago*, probably *S. canadensis*. *Polygnotus* sp. was reared from this midge.

Male. Length 3 mm. Antennae as long as the body, sparsely haired, yellowish brown; 16 segments, the fifth with a stem one-fourth longer than the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, tapering to a narrowly rounded apex. Palpi; first segment short, expanded distally, second narrowly oval, the third one-half longer, more slender. Mesonotum dark grayish brown, the submedian lines thickly haired. Scutellum dark reddish brown with numerous long setae apically, postscutellum reddish yellow. Abdomen fuscous yellowish, the segments rather thickly clothed dorsally and posteriorly with fuscous hairs; venter lighter. Genitalia yellowish brown, thickly haired. Costa reddish brown. Halteres fuscous yellowish, brown subapically. Legs a somewhat variable fuscous yellowish; claws slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, terminal clasp segment short, swollen near the middle; dorsal plate short, deeply and triangularly emarginate; ventral plate short, deeply and triangularly emarginate. Harpes rather long, tapering. Type Cecd. 11655a.

RHOPALOMYIA Rubs.1892 **Rubsaamen, E. H.** Berl. Ent. Zeitschr., 37: 328, 3701895 **Kieffer, J. J.** Wien Ent. Zeit., 14: 9

1896 ———— Wien Ent. Zeit., 15: 89

1897 ———— Syn. Cecd. de Eur. & Alg., p. 21

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 362-63

1909 ———— Ent. Soc. Ont., 39th Rep't, p. 45

1910 **Rubsaamen, E. H.** Zeitsch. Wissenschaft. Insektenbiol., 15: 3361911 **Felt, E. P.** N. Y. Ent. Soc. Jour., 19: 461913 **Kieffer, J. J.** Gen. Insect., fasc. 152, p. 43

The American representatives of this genus have a very close general resemblance, being usually reddish brown, rather large insects. They vary widely in certain characteristics, the male antennae ranging in number from 23 segments down to 12 segments, and the stem of the fifth segment varying in length from about

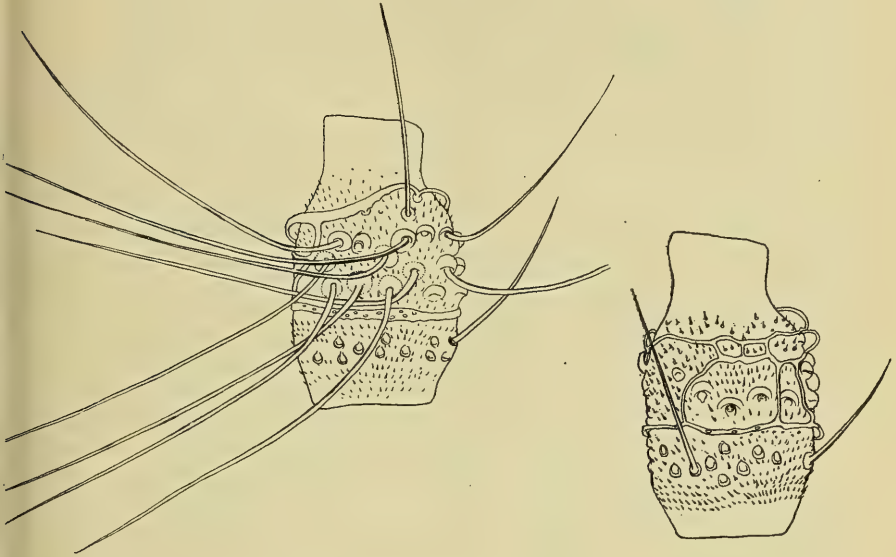


Fig. 51 *Rhopalomyia* species; two views of fifth antennal segment to show modifications in the circumfili, enlarged (original)

one-fourth longer than the basal enlargement to a stem only one-third the length of the basal enlargement. The segments of the female antennae vary in number from 25 to 13 and may have a stem one-third the length of the basal enlargement or be practically sessile. The palpi are uni- or bi-articulate. The male genitalia and the ovipositor of the female are quite characteristic of the genus, though approached in form by certain other genera. The general appearance of the wing is characteristic, the third vein uniting with the margin at or very close to the apex, while the distal third of the fifth vein is very faint (Plate 17,



Fig. 52 *Rhopalomyia* sp.; female palpus, enlarged (original)

figure 3). The claws are invariably simple and the pulvilli usually as long or a little longer than the claws.

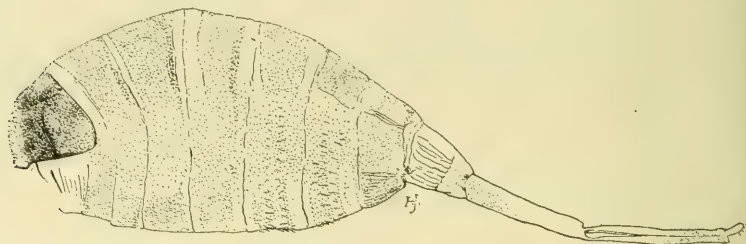


Fig. 53 *Rhopalomyia* sp.; lateral view of abdomen showing the extensile ovipositor, enlarged (original)

Species of *Rhopalomyia* show a marked preference for flower or bud galls, a very large proportion inhabiting deformed buds, among which may be classed the conspicuous apical rosette galls, the smaller flower or bud galls and reduced flower heads. A number also breed in leaf galls, such for example, as *R. pedicellata* and *R. fusiformis*, both of which inhabit a very characteristic type of gall which may appear on the stem, the leaf or in the flower head. It would appear that even this might originate while the tissues were in the bud and therefore most susceptible to injury. The well-known *Rhopalomyia hirtipes* produces a very characteristic gall at the apex of aerial or subterranean stems, the former being well known and the latter a recent discovery; both are in reality bud galls.

American members of this genus display a marked preference for *Solidago*, some sixteen species having been reared therefrom, while the closely allied aster supports four additional forms. Each species of this genus producing a gall on *Solidago* makes a characteristic deformity which appears to be correlated with marked structural differences in the adult and presumably by variations in habits.

Key to species

- a Antennae with 20 or more segments
 - b 24 to 25 antennal segments; abdomen dark reddish brown; palpi biarticulate; female; reared from loose, rosette galls on *Solidago canadensis* carolina Felt, C. 1635
 - bb 22 to 23 antennal segments
 - c Abdomen dark brown; legs dark brown; antennal stem one-fourth longer than the basal enlargement; palpi biarticulate; male major Felt, C. 90

- cc* Abdomen reddish brown or brownish red; antennal stem in male three-fourths and in female one-third the length of the basal enlargement; reared from subglobular stem or rootstalk gall on *Solidago*
hirtipes O. S., C. a1059, a1284
- ccc* Abdomen reddish yellow, stem of fifth antennal segment with a length one-half that of the basal enlargement. . . *uniformis* n. nom. C. 817
- bbb* 20 to 21 antennal segments
- c* Antennal stem one-fourth longer than the basal enlargement; abdomen fuscous yellowish; legs fuscous yellowish
- d* Palpi biarticulate, the basal enlargement with a length twice its diameter; male; reared from terminal rosette gall on *Solidago*
capitata Felt, C. a1750
- dd* Palpi uniarticulate, basal enlargement with a length one-half greater than its diameter; male; reared from terminal rosette gall on *Solidago*. *inquisitor* Felt, C. a1750a
- cc* Antennal stem as long as the basal enlargement
- d* Abdomen yellowish red; mesonotum reddish brown; wings narrow; antennae with 18 to 20 segments; male; reared from subglobular budlike gall on *Solidago*. *racemicola* O. S., C. a1605
- dd* Abdomen dark fuscous yellowish; mesonotum brown; wings broad; ventral plate deeply emarginate; male. . . . *apicata* Felt, C. 529
- ddd* Abdomen dark brown; mesonotum dark brown; wings broad, ventral plate slightly emarginate; male; reared from subcylindric, pubescent bud gall on *Solidago*. *anthophila* O. S., C. 1039, a1608
- ccc* Antennal stem three-fourths the length of the basal enlargement
- d* Wings with whitish cast; abdomen fuscous yellowish; mesonotum dark brown; palpi biarticulate; male; reared from terminal rosette gall on *Solidago*. *albipennis* Felt, C. a1655
- dd* Wings hyaline; abdomen dark fuscous; mesonotum light brown; palpi uniarticulate; male; reared from fusiform leaf gall on *Euthamia*
fusiformis Felt, C. a1150
- cccc* Antennal segments sessile; abdomen fuscous reddish brown; mesonotum yellowish brown; palpi biarticulate; female; reared from terminal rosette gall on *Solidago*. *capitata* Felt, C. a1750, a1754
- d* Abdomen reddish orange; mesonotum yellowish brown; palpi uniarticulate; female; reared from axillary bud gall on *Aster*
lateriflori Felt, C. a1731
- aa* Antennae with 18 or 19 segments
- b* Antennal stem as long as the basal enlargement
- c* Abdomen reddish brown
- d* Palpi uniarticulate; male; bred from gall on *Baccharis*
californica Felt., C. 1003, 983, 984
- dd* Palpi biarticulate; male; reared from stem gall on *Baccharis*
baccharis Felt, C. 982
- cc* Abdomen fuscous yellowish; mesonotum reddish brown; palpi uniarticulate; male; reared from axillary bud gall on *Aster*
lateriflori Felt, C. a1731
- ccc* Abdomen dark brown, mesonotum reddish brown; probably from heads of *Senecio* or *Aster*. *cockerelli* n. sp., a1931

- cccc Abdomen yellowish red; mesonotum reddish brown; palpi biarticulate;
male; reared from subglobular, budlike gall on *Solidago*
racemicola O. S., C. a1605
- bb Antennal stem three-fourths the length of the basal enlargement
- c Palpi biarticulate
- d Abdomen brownish red; mesonotum dark red; male; reared from ovoid,
fleshy, root stock gall on *Solidago*. *thompsoni* Felt, C. 1100
- dd Abdomen and mesonotum dark brown; reared from sessile galls on
Aster branches. *crassulina* Ckll., C. a1825
- cc Palpi uniarticulate
- d Antennae with 19 segments
- e Abdomen dark brown; mesonotum reddish brown; male
abnormis Felt, C. 580
- ee Abdomen dark fuscous; mesonotum light brown; male; reared from
fusiform leaf gall on *Euthamia*. *fusiformis* Felt, C. a1150
- dd Antennae with 18 segments
- e Abdomen reddish brown; mesonotum reddish brown
- f Basal enlargement of antennal segments with a length one-half
greater than its diameter; lobes of dorsal plate truncate apically;
male. *truncata* Felt, C. 1050
- ff Basal enlargement of antennal segments with a length twice its
diameter; lobes of dorsal plate rounded distally; male; reared
from oval twig gall on *Aster*. *astericaulis* Felt, C. a1107
- ee Abdomen dark reddish brown; mesonotum reddish brown; male;
reared from fruit of *Juniperus*
Walshomyia juniperina Felt, C. 1049
- eee Abdomen fuscous yellowish
- f Mesonotum dark brown; reared from bulblike galls on *Solidago*
bulbula Felt, C. 1115
- ff Mesonotum shining red; male; bred from axillary bud gall on
Aster. *lateriflori* Felt, C. a1731
- eeee Abdomen yellowish brown; mesonotum reddish brown; male
pini Felt, C. 116
- bbb Antennal stem with a length one-third the basal enlargement
- c Abdomen fuscous yellowish; mesonotum fuscous yellowish; male; reared
from stemmed, fusiform gall on *Euthamia* leaves or stems
pedicellata Felt, C. a1650, a1311
- cc Abdomen dark reddish brown; mesonotum dark brown; female
palustris Felt, C. 1208
- bbbb Antennal segments sessile or nearly so
- c Palpi biarticulate
- d 19 Antennal segments
- e Abdomen and mesonotum reddish; female; reared from subcylindric,
pubescent bud gall on *Solidago*
anthophila O. S., C. 1039, a1608
- ee Abdomen reddish brown; mesonotum dark reddish brown; female;
reared from stem gall on *Baccharis*. *baccharis* Felt, C. 982
- dd 18 Antennal segments
- e Abdomen dark carmine; mesonotum bright yellowish; scutellum pale
yellow; female; reared from subglobular, budlike gall on *Solidago*
racemicola O. S., C. a1605

- ee* Abdomen and mesonotum dark brown or black; scutellum dark reddish brown; female; reared from ovoid, fleshy, root stock gall on *Solidago*.....*thompsoni* Felt, C. 1100
eee Abdomen deep reddish, mesonotum reddish brown; female; reared from *Artemisia gnaphalodes*
gnaphalodis Felt, C. 1382
cc Palpi uniarticulate
d Antennae with 19 segments
e Abdomen dark red; mesonotum reddish brown; legs fuscous yellowish; female; reared from stemmed, fusiform gall on *Euthamia* leaves or stems.....*pedicellata* Felt, C. a1650, a1311, 686
ee Abdomen dark brown; mesonotum reddish brown; legs dark brown; female; reared from subglobular stem gall on *Euthamia*
lobata Felt, C. a1647
eee Abdomen dark brown; mesonotum dark brown; tibiae and tarsi fuscous; female; reared from dwarf flower heads of *Aster*
asteriflorae Felt, C. a1757
eeee Abdomen fuscous yellowish; mesonotum yellowish brown; legs fuscous yellowish; female; reared from terminal rosette gall on *Solidago*.....*inquisitor* Felt, C. a1750a
dd Antennae with 18 segments
e Abdomen reddish brown; mesonotum brown; legs dark brown; female; reared from fusiform leaf gall on *Euthamia*
fusiformis Felt, C. 843, a1150
ee Abdomen pale yellowish; mesonotum dark brown; legs fuscous yellowish; female; reared from bulblike galls on *Solidago*
bulbula Felt, C. 1115
eee Abdomen light brown; mesonotum dark brown; legs light brown; female; reared from gall on *Bigelowia*
bigelovioides Felt, C. 940
eeee Abdomen reddish brown; mesonotum dark reddish brown; legs light brown; female; reared from gall on *Baccharis*
californica Felt, C. 1003, 983, 984
aaa Antennae with 17 segments or less
b Antennae with 17 segments
c Antennal stem as long as the basal enlargement
d Abdomen fuscous yellowish; mesonotum fuscous yellowish; male; reared from woolly apical bud gall on ?*Antennaria*
pilosa Felt, C. 1215
dd Abdomen light brown; mesonotum shining brown; male; reared from flower galls on *Solidago*.....*cruziana* Felt, C. 942
cc Antennal stem three-fourths the length of the basal enlargement
d Abdomen light yellowish; mesonotum light brown; male; reared from apical rosette gall on *Euthamia*.....*lanceolata* Felt, C. 784
dd Abdomen fuscous yellowish; mesonotum dark reddish brown; reared from flower gall on *Artemisia*.....*betheliana* Ckll., C. a1935
ccc Antennal stem one-third the length of the basal enlargement
d Abdomen light brown; mesonotum dark brown; female; reared from gall on *Bigelowia*.....*bigelovioides* Felt, C. 940

- dd* Abdomen fuscous yellowish; mesonotum dark brown; female; reared from woolly apical bud gall on ? *Antennaria. pilosa* Felt, C. 1215
cccc Antennal segments sessile or nearly so
d Abdomen and mesonotum reddish brown; scutellum reddish yellow; female; reared from fruit of *Juniperus*
Walshomyia juniperina Felt, C. 1049
dd Abdomen dull red; mesonotum and scutellum dark red; female; reared from very small, fusiform gall on *Solidago* leaves
clarkei Felt, C. a1634
ddd Abdomen dark reddish; mesonotum dark brown; reared from apical flower gall on *Artemisia. betheliana* Ckll., C. a1935
bb Antennae with 16 segments
c Antennal stem with a length three-fourths that of the basal enlargement
d Abdomen dark reddish brown; mesonotum dark brown; male; reared from woolly bud gall on *Antennaria. . antennariae* Whlr., C. 960
cc Antennal stems one-half the length of the basal enlargement
d Palpi biarticulate; reared from an oval, enlarged bud of *Artemisia*
tridentatae Rubs.
dd Palpi uniarticulate; reared from gooseberry buds
grossulariae Felt, C. a2173
ccc Antennal stems one-third the length of the basal enlargement
d Abdomen dark reddish or yellowish brown; mesonotum brownish black; reared from woolly, globular gall on branches of *Artemisia*
alticola Ckll., C. 768, a1353
cccc Antennal segments sessile or nearly so
d Abdomen dark reddish brown; mesonotum dark brown; female; reared from woolly bud gall on *Antennaria. . antennariae* Whlr., C. 960
bbb Antennae with 15 segments
c Antennal stem one-fourth longer than the basal enlargement
d Abdomen yellowish brown; legs dark brown; on *Solidago*; male
arcuata Felt, C. 124
cc Antennal stems with a length three-fourths that of the basal enlargement
d Abdomen and mesonotum brown; palpi uniarticulate; male; reared from suboval flower or bud galls on *Gutierrezia*
gutierreziae Ckll., C. a1742
ccc Antennal segments sessile or nearly so
d Palpi biarticulate
e Abdomen light brown; mesonotum shining brown; female; reared from flower galls on *Solidago. cruziana* Felt, C. 942
dd Palpi uniarticulate
e Abdomen yellowish; mesonotum reddish brown; female; reared from apical rosette gall on *Euthamia. lanceolata* Felt, C. 784
ee Abdomen reddish or light yellowish brown; mesonotum reddish brown; female; reared from a hollow gall on *Bigelowia*
bigeloviae Ckll., C. 1070
bbbb Antennae with 13 to 14 segments
c Abdomen brownish red; mesonotum reddish brown; female; reared from suboval flower or bud gall on *Gutierrezia*
gutierreziae Ckll., C. a1742
cc Abdomen and mesonotum dark brown; female; reared from gall on *Audibertia. audibertiae* Felt, C. 1029

bbbb Antennae with 12 segments

c Antennal stem with a length three-fourths that of the basal enlargement

d Abdomen and mesonotum dark brown; palpi uniarticulate; male;
reared from gall on *Audibertia*. *audibertiae* Felt, C. 1029

dd Abdomen deep fuscous orange; palpi biarticulate; reared from petiole
or bud gall on chestnut. *castaneae* Felt, C. 1716

***Rhopalomyia crassulina* Ckll.**

1908 Cockerell, T. D. A. Can. Ent., 40: 89

This dark brown species was reared early in October 1907 from sessile galls on the branches of *Aster crassulus* taken at Rydberg in Boulder, Col.

Gall. Length 7 mm, short, oval, "densely covered with white hair and appearing something like small, green peaches." These galls are sessile on the branches, often two placed side by side.

Male. Length 1.5 mm. Antennae three-fourths the length of the body, sparsely haired, dark brown; 18 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length nearly twice its diameter; terminal segment produced, with a length about four times its diameter, tapering, obtuse. Palpi; the first segment short, stout, narrowly oval, with a length nearly twice its diameter, the second short, stout, broadly oval. Mesonotum dark brown, submedian lines sparsely haired. Scutellum and post-scutellum yellowish. Abdomen dark brown, basally and the distal segment lighter; membrane and plurae yellowish. Genitalia fuscous. Wings hyaline, costa light brown; halteres pale yellowish. Legs mostly fuscous yellowish; femora darker apically, the tarsi somewhat lighter than the tibiae. Genitalia; basal clasp segment short, stout; terminal clasp segment very short, stout. Other organs indistinct in the preparation. Cecid. 1825.

Described from a specimen kindly contributed by Prof. T. D. A. Cockerell.

***Rhopalomyia cockerelli* n. sp.**

Three males referable to this species were received February 16, 1908 from Prof. T. D. A. Cockerell of Boulder, Col. They are labeled: "September 29, on window, probably from heads of *Senecio* or *Aster*."

Male. Length 2 mm. Antennae about as long as the body, sparsely haired, dark brown; 19 segments, the fifth with a stem as long as the basal enlargement, the latter subglobose, with a length a little greater than its diameter; terminal segment produced, narrowly oval, with a length about three times its diameter. Palpi; one segment with a length over twice its diameter, tapering, narrowly rounded. Mesonotum reddish brown, the submedian lines fuscous yellowish, sparsely haired. Scutellum fuscous yellowish, with a

few coarse setae apically, postscutellum fuscous yellowish anteriorly. Abdomen sparsely clothed with long hairs, dark brown, the basal segment fuscous, the penultimate segment somewhat fuscous; genitalia yellowish. Wings hyaline, costa dark brown. Halteres yellowish basally, fuscous and whitish apically. Coxae fuscous yellowish, femora and tibiae lighter fuscous yellowish, tarsi mostly dark brown; claws stout, strongly curved, the pulvilli one-half longer than the claws. Genitalia; basal clasp segment stout; distal clasp segment short, greatly swollen, the insertion almost subapical; dorsal plate short, broad, broadly and triangularly emarginate; ventral plate long, broad, broadly and roundly emarginate. Harpes conspicuous, irregularly rounded. Type Cecid. a1931.

***Rhopalomyia betheliana* Ckll.**

1909 Cockerell, T. D. A. Can. Ent., 41: 150-51

This species was reared March 30, 1909 from a flower gall of *Artemisia frigida* sent to us through the courtesy of Professor Cockerell from Denver, Col. Galls of this species on *Artemisia filifera* were also received from Prof. C. P. Gillette, Fort Collins, Col., in September 1909.

Gall. The gall is about 3 mm long, 2 mm broad, obpyriform, the apex truncate. It is pale yellowish with a fine, white tomentum.

Pupa. The pupa has been characterized by Professor Cockerell as a bright orange scarlet with a pair of prominent anterior projections.

Male. Length 2 mm. Antennae nearly as long as the body, sparsely haired, reddish brown; 17 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length two and one-half times its diameter. Palpi; the one segment is stout, variably fusiform. Mesonotum shining dark reddish brown, the submedian lines sparsely haired. Scutellum shining dark brown, postscutellum reddish brown. Abdomen sparsely haired, a dull fuscous yellowish, the basal segment darker. Wings hyaline, costa light brown. Halteres yellowish basally, fuscous apically. Coxae dark brown. The legs a nearly uniform light fuscous yellowish; claws rather stout, evenly curved, the pulvilli nearly as long as the claws. Genitalia; basal clasp segment stout; terminal clasp segment short, greatly swollen near the basal third; dorsal plate long, broad, deeply and triangularly emarginate, ventral plate long, truncate. Harpes narrow, narrowly rounded.

Female. Length 2 mm. Antennae extending to the third abdominal segment, sparsely haired, yellowish brown; 17, sometimes 16, segments, the fifth sessile, cylindric, with a length three times its diameter, the terminal segment reduced, narrowly oval or fused with the preceding. Palpi as in the male. Mesonotum dark brown, the submedian lines sparsely haired. Scutellum dark reddish brown, postscutellum dark brown. Abdomen sparsely haired, dark reddish, the ovipositor yellowish. Halteres whitish basally

pale orange distally. Legs nearly uniform pale yellowish brown, the pulvilli shorter than the strongly curved claws. Ovipositor about one-half the length of the abdomen, the terminal lobe stout, with a length only a little greater than its width. Type Cecid. a1935.

***Rhopalomyia clarkei* Felt**

- 1907 **Felt, E. P.** New Species of Cecid. II, p. 18
 1908 ———— N. Y. State Mus. Bul. 124, p. 299, 367
 1909 ———— Ottawa Nat., 22:248

This species was reared October 8, 1907 from a very small, fusiform, pale green gall occurring mostly on the underside of the terminal leaves of *Solidago rugosa* and taken by Miss Cora H. Clarke at Tamworth, N. H. A few galls of apparently the same species were received from Miss Clarke from Magnolia, Mass. Similar galls were also sent September 20, 1907 by Mr T. D. Jarvis of Ontario, Canada, and taken by him on *Solidago canadensis*. We took this gall on *Solidago canadensis* at Asheville, N. C., September 29, 1906.

Gall. This is a minute, fusiform, greenish, or purplish-striped, frequently ribbed gall arising from the underside of the leaf about midway between the midrib and the edge. It is only about 1.6 mm long, a variable greenish and dark brown and sparsely clothed with rather coarse, whitish hairs. See plate 16, figure 1 and also New York State Museum Bulletin 175, plate 1, figure 21 and 21a for illustrations.

Male. Length 1.75 mm. Antennae about as long as the body, sparsely haired, dark brown; 19 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length about twice its diameter; terminal segment reduced, narrowly oval and slightly fused with the preceding. Palpi; one slender, irregular segment with a length about four times its diameter. Mesonotum dark reddish brown, the submedian lines sparsely haired. Scutellum reddish orange, postscutellum yellowish. Abdomen rather thickly haired, dark brown, the distal segments lighter. Wings hyaline, costa reddish brown. Halteres yellowish basally, light fuscous apically. Coxae and femora basally pale yellowish, the distal portion of femora and tibiae yellowish straw; tarsi a variable reddish or fuscous yellowish. Claws slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, obtusely rounded; terminal clasp segment long, tapering; dorsal plate broad, deeply and triangularly incised; ventral plate long, broadly rounded apically. Harpes short, broad, truncate.

Female. Length 2 mm. Antennae about two-thirds the length of the body, sparsely haired, fuscous yellowish, basal segment and face fuscous; 17 segments, the fifth with a stem one-fifth the length of the basal enlargement, which latter has a length two and one-half times its diameter; terminal segment produced, tapering, obtuse.

Palpi; one irregularly fusiform segment with a length about two and one-half times its diameter. Mesonotum shining dark brown, the submedian lines sparsely haired. Scutellum dark red, post-scutellum fuscous. Abdomen dull red, the small dorsal sclerites somewhat fuscous, membrane and pleurae deep reddish orange, ovipositor fuscous yellowish. Wings hyaline, costa fuscous straw. Halteres yellowish basally, fuscous subapically, dull orange apically. Legs a variable fuscous yellowish. Ovipositor as long as the abdomen, the terminal lobes long, stout, narrowly rounded. Otherwise practically as in the male. Type Cecid. a1634.

***Rhopalomyia carolina* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 363

1909 ———— Ottawa Nat., 22: 247

This species was reared from large, loose, leafy heads on *Solidago canadensis* taken at Asheville, N. C., September 17, 1906, the adult appearing October 5th.

Gall. The deformed head produced by this species is about 11 cm in diameter and 3 cm high. It is composed of a number of smaller heads united in one large bunch. The free edges of many of the leaves project above the more solid mass by half to three-fourths of their length.

Female. Length 6 mm. Antennae extending to the second abdominal segment, sparsely haired, dark red; 24 to 25 segments,

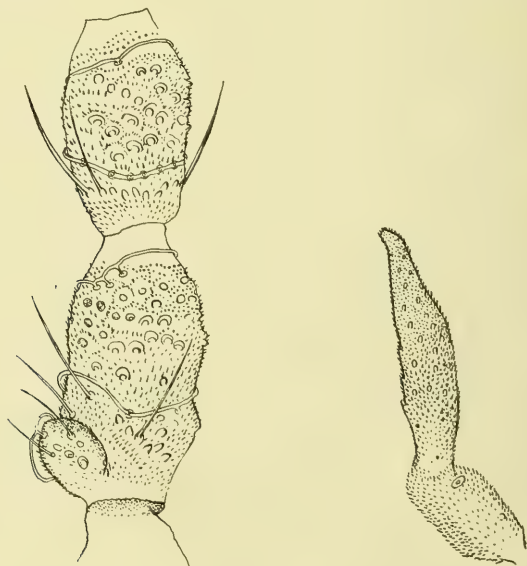


Fig. 54 *Rhopalomyia carolina*; two antennal segments, showing a rudimentary one at the base of the lower, and palpus enlarged (original)

the fifth subfusiform, sessile. Palpi; the first segment stout, sub-cylindric, second more slender, fusiform and about twice the length of the first; face reddish brown. Mesonotum reddish brown with submedian lines marked by distinct ridges, the area between distinctly lighter. Scutellum reddish brown, thickly clothed with coarse, black setae, postscutellum reddish brown. Abdomen dark reddish brown, the dorsal sclerites thickened and darker than the incisures or pleurae. Ovipositor pale yellowish red, the extreme tip reddish brown. Wings subhyaline, unspotted, costa dark brown; halteres pale orange basally, dark brown apically. Coxae, femora and tibiae a variable dark brown, tarsi reddish brown, the segments narrowly annulate distally with dark brown, basal seg-



Fig. 55 *Rhopalomyia carolina*; lateral view of the tip of the ovipositor, enlarged (original)

ments of the posterior tarsi mostly dark brown; claws very heavy, evenly curved. Ovipositor long, the lobes roundly tapering. Type Cecid. ar635.

***Rhopalomyia major* Felt**

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 121 (separate p. 25)

1908 ——— N. Y. State Mus. Bul. 124, p. 363

This rather large species was taken May 31, 1906 in a trap lantern at Huguenot Park, N. Y.

Male. Length 4 mm. Antennae longer than the body, thickly white-haired, dark brown; 22 to 23 segments, the fifth with a stem one-fourth longer than the basal enlargement; terminal segment reduced, suboval. Palpi; the first segment stout, elongate, oval, the second a little longer, much more slender; face yellowish brown. Mesonotum dark brown, distinct submedian lines with fuscous hairs, similar hairs on the lateral margin. Scutellum yellowish brown, postscutellum yellowish brown, fuscous laterally. Abdomen

yellowish brown, rather thickly clothed with long, fuscous hairs. Wings subhyaline, costa dark brown; halteres yellowish transparent at base, fuscous, apically. Legs brownish black, the femoro-tibio

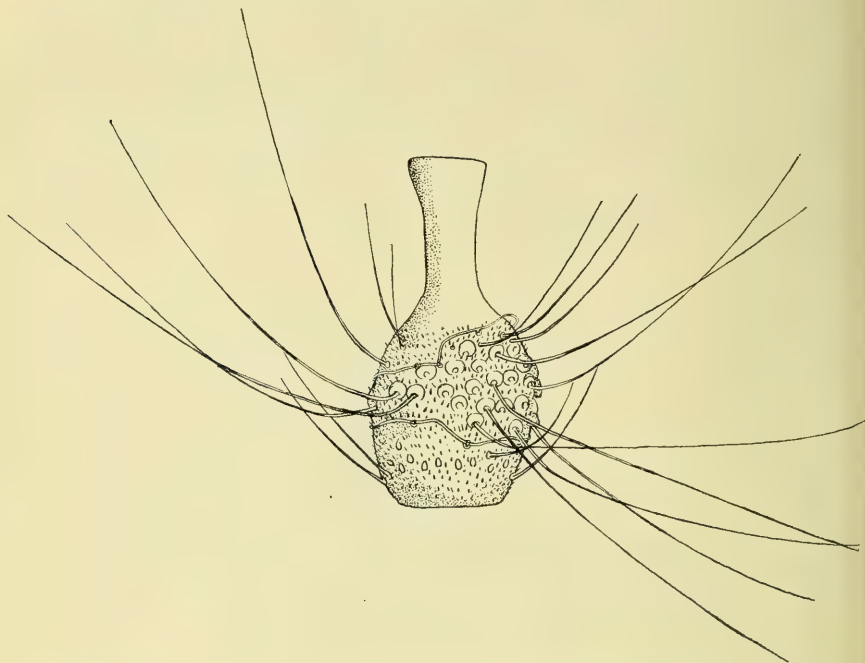


Fig. 56 *Rhopalomyia major*; fifth antennal segment of male, enlarged (original)

articulation tinged with reddish, tarsi dark brown; claws stout, slightly curved. Genitalia; basal clasp segment stout; terminal clasp segment very stout, short; dorsal plate broad, the lobes broadly rounded apically, obliquely truncate; ventral plate broad, deeply and roundly emarginate. Harpes strongly chitinized internally, with two heavy, chitinous bars, converging at each extremity, broadly rounded. (Plate 19, figure 1). Type Cecid. 90.

Rhopalomyia hirtipes O. S.

- 1862 **Osten Sacken, C. R.** Mon. Dipt. N. Amer. 1: 195 (Cecidomyia)
- 1905 **Felt, E. P.** N. Y. State Mus. Bul. 97, p. 410-11
- 1908 ——— N. Y. State Mus. Bul. 124, p. 363
- 1909 ——— Ottawa Nat., 22: 249
- 1910 **Stebbins, F. A.** Springf. Mus. Nat. Hist. Bul. 2, p. 52
- 1913 **Beutenmuller, William.** Canad. Ent., 45: 413-14 (Dasyneura)

The species has been accounted somewhat rare in New York State though observations in September 1909 showed that under

certain conditions it might be exceedingly abundant. The normal type of gall, namely, the aerial apical deformity, is comparatively rare. On the other hand, the enlargements it produces on buds starting from root stocks and rarely extending above the surface of the ground, may be exceedingly common. In either case the gall usually splits open much in the same way as the husks of a hickory nut, allowing the reddish brown adults to escape from the somewhat fibrous, polythalamous interior. The flies appear in New York the latter part of August or early in September. Oviposition takes place a day or two after emergence, according to the observations of Miss Cora H. Clarke of Boston, Mass., the eggs being deposited promiscuously in a breeding jar containing the insects. Should this prove to be a normal habit of the species in the open, the insect must winter as very young larvae in rudimentary galls.

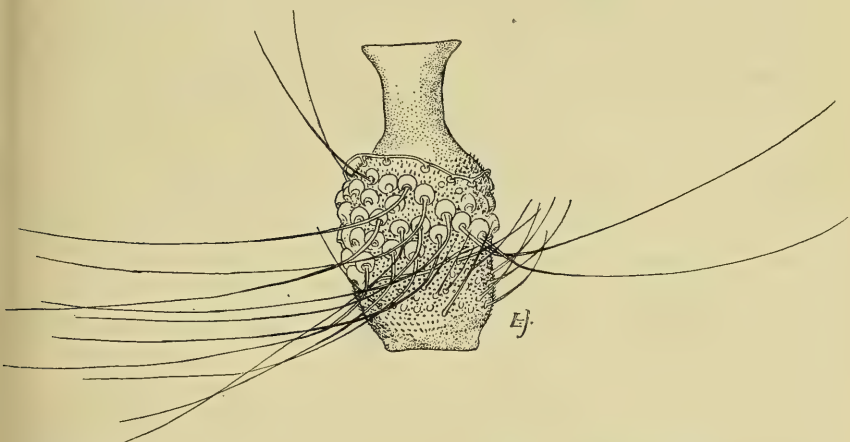


Fig. 57 *Rhopalomyia hirtipes*; fifth antennal segment of male, enlarged (original)

The galls of this species have been taken at Elizabethtown, N. Y., in numbers in and about Albany, N. Y., and at Springfield and Magnolia, Mass. The gall of apparently this form was received from Mr L. H. Weld of Evanston, Ill.

Gall. The aerial, better known type of gall has a diameter of 2.5 cm. It is smooth, brownish on the outside, the interior filled with a white pithy substance containing several larvae. The type of gall found at or just below the surface of the ground and evidently developing from root stock buds, varies greatly in size, ranging from about .5 to 2.5 cm in diameter. It may be globular or subglobular and has an interior similar to that described above. This

type of gall may occur in clusters about the base of the stems of *Solidago juncea*. (Plate 9, figures 1, 2. Plate 12, figure 2). See New York State Museum Bulletin 97 for a description of the midge, and Museum Bulletin 175, plate 4 figure 11, for a colored illustration of this gall. The male genitalia are illustrated on Plate 19, figure 2.

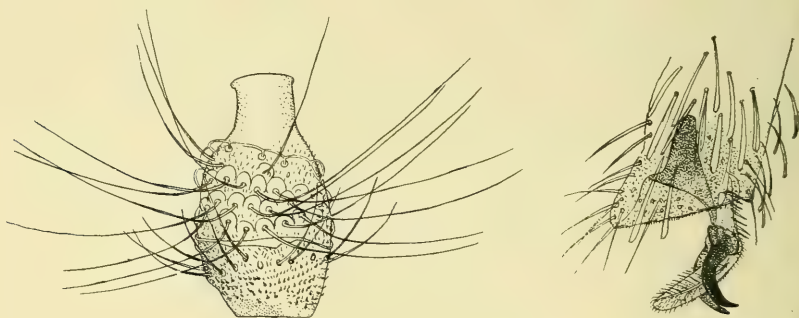


Fig. 58. *Rhopalomyia hirtipes*; fifth antennal segment of female, and claw with the apex of the tarsus, enlarged (original)

***Rhopalomyia uniformis* n. nom.**

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 160-61 (*Hormomyia truncata*)

This large midge, closely allied to *R. hirtipes* O. S., though probably distinct therefrom, was taken by Mr J. G. Jack near Boston, Mass.

Male. Length 3 mm. Antennae nearly as long as the body, thickly haired, pale yellowish; 23 segments, the fifth with a stem one-half the length of the basal enlargement; terminal segment hardly reduced. Palpi; first segment subquadrate, with a length one-fourth greater than its diameter, the second probably twice the length of the third, tapering. Mesonotum a nearly uniform dark reddish brown, submedian lines indistinct. Scutellum yellowish red, postscutellum slightly yellowish basally, reddish yellow distally. Abdomen thickly clothed with long, fuscous hairs, reddish yellow, the genitalia dark orange. Halteres yellowish basally, fuscous apically. Legs a variable dark brown and reddish yellow, the distal tarsal segments mostly reddish yellow; claws slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment stout, distinctly lobed, terminal clasp segment long, slender, hardly swollen; dorsal plate broad, broadly and roundly emarginate; ventral plate tapering, roundly truncate, both setose. (Plate 18, figure 3). Type Cecid. 817.

***Rhopalomyia capitata* Felt**1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 363, 364

1909 ———— Ottawa Nat., 22: 247

This rather large species appears to be quite abundant in some localities. It seems to have a pronounced gregarious habit judging from the large number of galls on limited patches of *Solidago serotina* and *S. canadensis*. The galls attain full development from the middle till the latter part of September, the insects appearing in considerable numbers shortly thereafter, as many as 62 being reared in one day from a lot of galls. A Tachinid, *Dichaetaneura leucoptera* Johns., determined by its describer, was reared September 7, 1906 from this gall and presumably from this species.

Gall. The terminal rosette galls produced by this species are about 2.5 cm in diameter and composed of numerous small cells, each surrounded by a few leaflets about one-fourth the normal size and the entire mass is provided with a calyxlike whorl of longer leaflets. The length of the leaflets around the individual cells and the mass appears to be very naturally correlated with the degree of infestation, since the more populous heads have shorter leaflets. The individual galls occur at the base of the deformity among the leaflets, are somewhat conical in shape, about 4 mm high, 2 mm in diameter and not very unlike the gall of *R. racemicola*. See plate 10, figure 2; plate 13, figures 1, 2, and also New York Museum Bulletin 175, plate 1, figure 1, for a colored illustration.

Male. Length 2.5 mm. Antennae as long as the body, sparsely

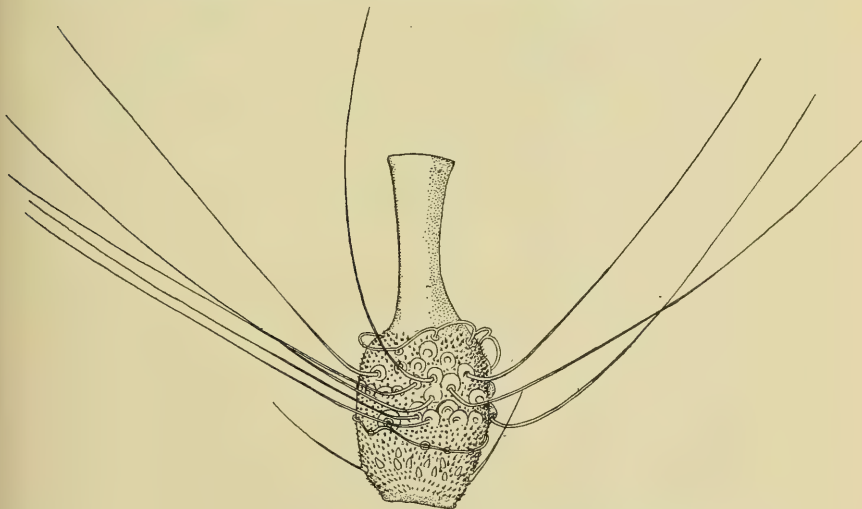


Fig. 59 *Rhopalomyia capitata*; fifth antennal segment of male, enlarged (original)

haired, pale or fuscous yellowish; 20 segments, the fifth with a stem one-fourth longer than the basal enlargement, which latter has a length nearly twice its diameter and tapers at both extremities; terminal segment produced, subcylindric, tapering, obtuse. Palpi; the first segment short, stout, subquadrate, with a length about one-half greater than its diameter, the second long, stout, about three times the length of the first. Mesonotum reddish brown, the submedian lines thickly haired. Scutellum reddish brown with numerous long setae apically, postscutellum fuscous. Abdomen fuscous yellowish, thickly haired. Wings hyaline, costa light brown. Halteres yellowish basally, fuscous apically. Legs a variable fuscous yellowish, the distal tarsal segments usually lighter; claws long, slender, evenly curved, the pulvilli about as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout, greatly swollen basally; dorsal plate short, broad, apparently broadly rounded; ventral plate long, narrow, narrowly rounded. Harpes stout, narrowly rounded, convolute.

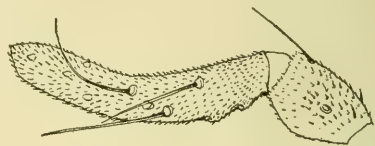


Fig. 60 *Rhopalomyia capitata*; male palpus, enlarged (original)

Female. Length 3 to 4 mm. Antennae extending to the fourth abdominal segment, sparsely haired, reddish brown; 21 segments, the fifth sessile, with a length about twice its diameter; terminal segment partly fused with the preceding, reduced, conical. Palpi; the first segment short, stout, subquadrate, with a length about twice its diameter, the second more than twice the length of the first, tapering at both extremities and thickly clothed with stout setae. Mesonotum yellowish brown, the submedian lines thickly haired. Scutellum reddish brown, postscutellum fuscous salmon. Abdomen fuscous reddish brown, the incisures and pleurae reddish salmon; ovipositor fuscous yellowish. Wings hyaline, costa dark brown. Halteres yellowish basally, fuscous apically. Coxae and base of femora reddish yellow, distal portion of femora, tibiae and tarsi brown or black; the pulvilli longer than the claws. Ovipositor about two-thirds the length of the abdomen, the terminal lobes narrowly oval. Type Cecid. a1750.

Rhopalomyia solidaginis Loew.

- 1862 Osten Sacken, C. R. Mon. Dipt. N. Am., 1: 194-95 (Dasyneura)
- 1874 Glover, Townend. MS Notes from My Journal, p. 68 (Cecidomyia)
- 1892 Beutenmueller, William. Am. Mus. Nat. Hist., 4: 271 (Cecidomyia)
- 1900 Smith, J. B. List Insects N. J., p. 620 (Cecidomyia)
- 1904 Beutenmueller, William. Am. Mus. Nat. Hist. Guide Leaflet 16, p. 31 (Cecidomyia)
- 1905 Cook, M. T. Dep't Geol. & Nat. Res., Ind., 29th Rep't, p. 842 (Cecidomyia)
- 1907 Jarvis, T. D. Ent. Soc. Ont., 37th Rep't, p. 68 (Cecidomyia)
- 1909 ——— Ent. Soc. Ont., 39th Rep't, p. 81 (Cecidomyia)
- 1910 Stebbins, F. A. Springf. Mus. Nat. Hist. Bul., p. 50 (Dasyneura)

This gall appears to be very common in different parts of the country, though it is possible that several species of gall flies are responsible for the production of apparently identical vegetable deformities. The gall, as described by Doctor Loew, is a globular head $1\frac{1}{2}$ to 2 inches in diameter, formed of hundreds of leaves, the exterior ones being only a little altered, the interior more and more narrow. This structure results from the coalescence of several deformed aborted twigs and at the tip of each is a single gall with a compartment, shaped some like a small seed and having in its interior a cavity widened a little below. *Rhopalomyia capitata* may prove to be a synonym of this species. *Polygnotus* species was reared from this or a very similar gall.

Rhopalomyia lateriflori Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 364, 365

This species produces galls in the axils of the leaves of *Aster lateriflorus* at Lake George. Midges were obtained September 6, 1907. Apparently the same gall was found at Annisquam, Mass., by Miss Cora H. Clarke (plate 14, figure 2). *Polygnotus* species was reared from this gall.

The axillary gall produced by this species is round or slightly irregular and ranges in size from that of a small pea to about 10 mm in diameter. The color is usually greenish, the tip being brown.

Male. Length 1.5 mm. Antennae as long as the body, sparsely haired, light brown; 18 segments, the fifth with a stem as long as the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, tapering, obtuse. Palpi; one stout segment, broadly rounded apically. Mesonotum shining reddish brown. Scutellum dark orange, postscutellum fuscous. Abdomen fuscous yellowish. Genitalia fuscous. Wings hyaline, costa light straw. Halteres yellowish basally, fuscous apically. Legs a variable light brown; claws long, slender, evenly curved, the pulvilli one-half longer than the claws. Genitalia; basal clasp segment long, slender; terminal clasp segment short, greatly swollen; dorsal plate long, broad, slightly and roundly emarginate; ventral plate long, broad, broadly and roundly emarginate. Harpes heavy, convolute, narrowly rounded.

Female. Length 3 mm. Antennae one-half the length of the body, sparsely haired, yellowish orange, fuscous orange basally; 20 segments, the fifth with a stem one-fifth the length of the basal enlargement, which latter has a length twice its diameter; femora, tibiae and tarsi dark brown or black. Ovipositor nearly as long as

the abdomen, the terminal lobes with a length twice the diameter, broadly rounded apically. Type Cecid. a1731.

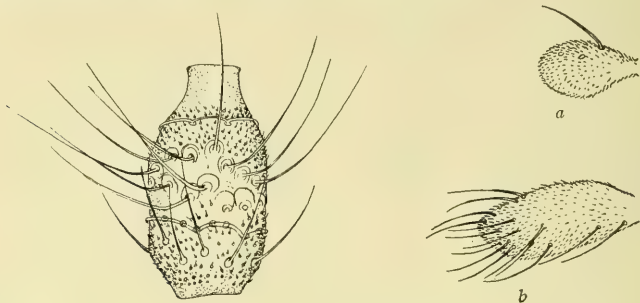


Fig. 61 *Rhopalomyia lateriflori*; fifth antennal segment of female; *a* male and *b* female palpus, enlarged (original)

Rhopalomyia inquisitor Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 364, 366

1909 ———— Ottawa Nat., 22: 247

This small form was reared from the same gall as that described under *R. capitata* Felt and it is presumably an inquiline. The species may possibly occur largely in the smaller galls comprising the large head or between the leaflets of the galls produced by *R. capitata*.

Male. Length 1.5 mm. Antennae as long as the body, sparsely haired, fuscous yellowish; 20 segments, the fifth with a stem one-fourth longer than the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced,

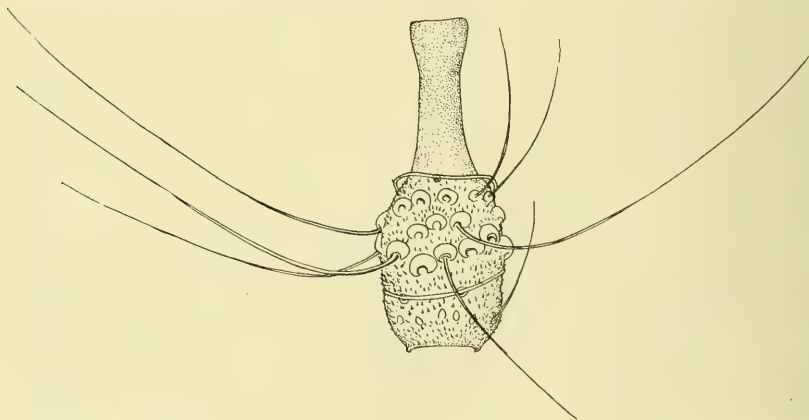


Fig. 62 *Rhopalomyia inquisitor*; fifth antennal segment of male, enlarged (original)

tapering, narrowly rounded. Palpi; one short, stout segment strongly constricted basally. Mesonotum shining yellowish brown, the submedian lines sparsely haired. Scutellum reddish brown, setose apically, postscutellum fuscous yellowish. Abdomen thickly haired, fuscous yellowish, the basal segments and genitalia fuscous. Wings hyaline, costa fuscous yellowish. Halteres yellowish basally, fuscous apically. Legs a variable fuscous yellowish; claws long,



Fig. 63 *Rhopalomyia inquisitor*; lateral view of last tarsal segment (a) and claw, and male (b) palpus, enlarged (original)

slender, evenly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment swollen; dorsal plate short, stout, broadly and triangularly emarginate; ventral plate long, broad, subtruncate. Harpes long, convolute, irregularly rounded.

Female. Length 2 mm. Antennae extending to the fourth abdominal segment, sparsely haired, pale yellowish; 19 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, tapering, acute. Palpi; one stout segment constricted basally. Ovipositor as long as the abdomen, the terminal lobes narrowly rounded. Other characters practically as in the male. Type Cecid. ar750a.

Rhopalomyia racemicola O. S.

- 1862 **Osten Sacken, C. R.** Mon. Dipt. N. Amer., 1: 196 (Cecidomyia)
 1907 **Beutenmueller, William.** Amer. Mus. Nat. Hist. Bul. 23, p. 393-94
 1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 120-21
 1908 ——— N. Y. State Mus. Bul. 124, p. 364, 366
 1909 ——— Ottawa Nat., 22: 246
 1909 **Jarvis, T. D.** Ent. Soc. Ont., 39th Rep't, p. 81
 1910 **Stebbins, F. A.** Springf. Mus. Nat. Hist. Bul. 2, p. 50

The gall was first noticed by Osten Sacken in 1862 and subsequently the larva and gall were figured and described by Beutenmueller. The gall is rather common about Albany and Poughkeepsie, N. Y., and probably other places in New York State, on *Solidago canadensis*. Adults were reared in early October. *Polygnotus* and *Torymus* species were reared from this midge.

Gall. It is a rather firm greenish or reddish subglobular budlike enlargement about 2 mm in diameter and usually with a slight apical protuberance. See plate 15, figure 2, and also New York Museum Bulletin 175, plate 1, figure 2, for a colored illustration.

Male. Length 2.5 mm. Antennae as long as the body, sparsely white-haired, fuscous yellowish, some of the terminal segments reddish; 18 to 20 segments, the fifth with a stem as long as the basal enlargement; terminal segment reduced. Palpi; small, composed of a rather long, large basal segment and a little longer distal one. Mesonotum reddish brown, submedian lines yellowish, broad, rather thickly haired. Scutellum and postscutellum yellowish red. Abdomen yellowish red, thickly haired, basal segment somewhat fuscous; genitalia reddish; halteres yellowish basally, fuscous apically. Coxae fuscous yellowish, femora, tibiae and tarsi mostly variable reddish; claws stout, slightly curved. Genitalia; basal clasp segment short, greatly swollen at the basal third; dorsal plate broad, deeply emarginate; ventral plate broad, acutely rounded. Harpes stout, convolute, a quadrate, subapical spur.

Female. Length 2.5 mm. Antennae extending to the base of the abdomen, thickly white-haired, pale yellowish, reddish fuscous basally; 18 segments, the fifth twice as long as its diameter, the two distal segments frequently fused. Palpi; the first segment long, slightly expanded distally, second about equal to the first, swollen basally, tapering; face reddish fuscous. Mesonotum pale brownish yellow, submedian lines sparsely black-haired. Scutellum pale yellowish red, postscutellum fuscous yellowish. Abdomen dark carmine, the dorsum of the posterior segments yellowish; terminal segments pale salmon. Wings (Plate 17, figure 4) hyaline, costa dark brown; femora and tibiae dark fuscous; tarsi black; claws heavy, strongly curved. Ovipositor nearly as long as the body, the terminal lobes rather broad, rounded. Type *Cecid.* ar605.

Rhopalomyia apicata Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 364

This species was taken in a trap lantern at Nassau, N. Y., July 7, 1906.

Male. Length 2.5 mm. Antennae about as long as the body, thickly haired, dark brown, basally fuscous, the stems semitransparent; 21 segments, the fifth with a stem as long as the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, tapering to an acute apex. Palpi; the first segment rather slender, with a length about two and one-half times its diameter, the second a little longer, acute distally; face fuscous. Mesonotum dark brown, the submedian lines yellowish, indistinct. Scutellum reddish brown, postscutellum yellowish brown. Abdomen dark fuscous yellowish, rather thickly clothed with short, fuscous hairs. Wings hyaline, costa light brown; halteres

pale yellowish. Legs a nearly uniform fuscous straw; claws long, slender, evenly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment long, slender; terminal clasp segment short, stout, greatly swollen near the middle; dorsal plate short, broad, broadly and roundly emarginate; ventral plate long, tapering distally, broadly and roundly emarginate. Harpes convolute, narrowly rounded. Type Cecid. 529.

Rhopalomyia anthophila O. S.

- 1869 **Osten Sacken, C. R.** Amer. Ent. Soc. Trans., 2: 302 (Cecidomyia)
 1892 **Beutenmueller, William.** Amer. Mus. Nat. Hist. Bul. 4, p. 272
 (Cecidomyia)
 1904 **Cook, M. T.** Ohio St. Univ. Bul. 17, p. 116
 1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 364, 365
 1909 ———— Ottawa Nat., 22: 246
 1910 **Stebbins, F. A.** Springf. Mus. Nat. Hist., Bul. 2, p. 50

The gall of this species is quite different from that produced by *R. racemicola*, in that it is more or less cylindric and densely haired. This species appears to be much more local than *R. racemicola*, since a cluster of galls taken on *Solidago canadensis* at Asheville, N. C., September 16, 1906 was limited to one portion of a flower head, and careful searching failed to disclose any others in the near vicinity. Galls of this species were taken in the vicinity of Albany, N. Y., adults appearing about the middle of September. This midge was reared by the late Dr C. V. Riley in what he designates as seed pods of *Solidago* taken September 11, 1876 at Bushburg, Mo. *Torymus* sp. was reared from this midge.

Gall. The deformity is a transformed flower head about 6 mm long, 3 mm in diameter, pale green, densely pubescent, nearly cylindric, the tip being somewhat smaller than the base. Osten Sacken states that the inside of the gall is hollow, divided into two compartments by a delicate, funnel-shaped membrane placed near the middle of the cavity, point upward, the larva occurring at the bottom of the lower compartment. See Plate 15, figure 1, and also New York Museum Bulletin 175, plate 1, figure 3, for a colored illustration.

Male. Length 2.5 mm. Antennae as long as the body, sparsely haired, fuscous yellowish; 18 to 20 segments, the fifth with a stem as long as the basal enlargement, which latter has a length one-half greater than its diameter, tapering; terminal segment slender, with a length about three times its diameter, acute. Palpi; the first segment stout, subquadrate, with a length about one-half greater than its diameter, the second long, slender, over twice the

length of the preceding. Mesonotum dark brown, the submedian lines inconspicuous. Scutellum reddish brown, postscutellum fuscous

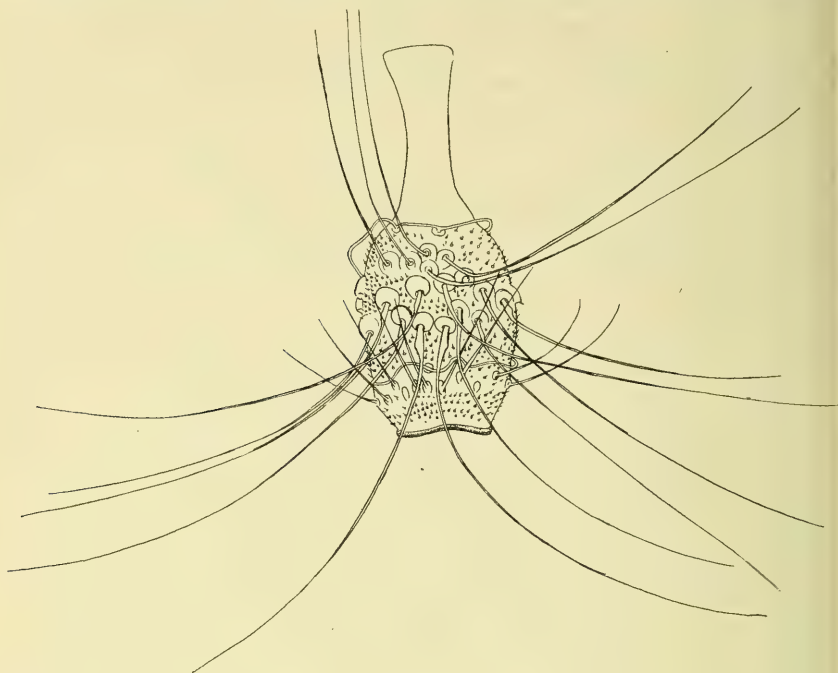


Fig. 64 *Rhopalomyia anthophila*; fifth antennal segment of male, enlarged (original)

yellowish. Abdomen thickly clothed with fine hairs, dark brown, the distal segments, genitalia and venter fuscous yellowish. Wings hyaline, costa light straw. Halteres yellowish basally, light fuscous apically. Legs a variable light straw, the distal tarsal segments somewhat lighter; claws long, slender, evenly curved, the pulvilli one-fourth longer than the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout, swollen near the basal third; dorsal plate short, stout, deeply and triangularly incised; ventral plate long, broad, broadly emarginate. Harpes broad, convolute, narrowly rounded, with two or three inconspicuous chitinous processes.

Female. Length 3 mm. Antennae extending to the fourth abdominal segment, sparsely haired, pale yellowish or yellowish brown; 19 segments, the fifth with a length two and one-half times its diameter, tapering; terminal segment produced, tapering, narrowly

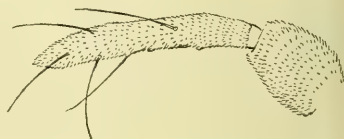


Fig. 65 *Rhopalomyia anthophila*; male palpus, enlarged (original)

obtuse. Palpi; the first segment short, stout, irregularly subquadrate, the second stout, with a length about five times its diameter, setose. Mesonotum shining reddish brown, the submedian lines indistinct. Scutellum dark reddish brown, postscutellum dark orange. Abdomen pale orange or fuscous brown, the segments margined posteriorly with fuscous hairs. Ovipositor about as long as the body, the terminal lobes long, narrowly oval, subacute. Wing and other characters practically as in the opposite sex. Type Cecid. ar608.

Rhopalomyia albipennis Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 364

1909 ———— Ottawa Nat., 22: 247

This species was reared in numbers August 9-14, 1907 from a large, terminal rosette gall on *Solidago canadensis* collected at Albany, N. Y. Both white and reddish larvae were observed in the gall, which latter presents no marked difference from that of *R. capitata*. Polygnotus species was reared from this midge. The gall is illustrated on plate 4, figure 1.

Male. Length 4 mm. Antennae distinctly longer than the body, presumably thickly haired; 21 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length one-half greater than its diameter and tapering at both extremities. Palpi; the first segment stout, with a length one-half greater than its diameter, the second slender, one-half longer than the first, acute apically. Mesonotum dark brown, the submedian lines sparsely haired. Scutellum reddish brown, postscutellum fuscous yellowish. Abdomen thickly clothed with long setae, fuscous yellowish, the basal segments dark brown or

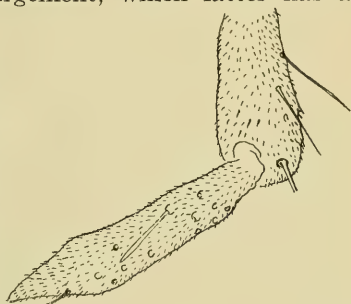


Fig. 66 *Rhopalomyia albipennis*; palpus, enlarged (original)

black. Genitalia fuscous. Wings hyaline, costa light brown. Halteres yellowish basally, fuscous apically. Legs fuscous yellowish; claws long, stout, evenly curved, the pulvilli one-half longer than the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment very short, stout, greatly swollen basally; dorsal plate short, broad, deeply and triangularly incised; ventral plate long, broad, deeply and narrowly incised. Harpes short, convolute, narrowly rounded.

Female. Length 5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, light brown; 21-22 subsessile segments, the fifth with a length twice its diameter and tapering at both extremities. Ovipositor one-half the length of the abdomen, the terminal lobes long, slightly constricted basally, roundly tapering, otherwise practically as in the male. Type Cecid. ar655.

***Rhopalomyia fusiformis* Felt**

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 120 (separate, p. 24)

1908 ——— N. Y. State Mus. Bul. 124, p. 364, 365, 366

1909 ——— Ottawa Nat., 22: 247, 249

The galls of this species are rather common on the narrow-leaved *Solidago*, *S. graminifolia*, in midsummer, the adults appearing the latter part of July.

Gall. This is a peculiar ribbed, elongate structure about 6 mm long, occurring singly or in masses on the stem or the under or upper surface of the foliage. The color is usually very nearly that of the stem or leaf though it may have a dark reddish tint. The gall is slightly fusiform, it being a little enlarged above the circular base and then tapering to a rather fine, frequently slightly curved tip; the surface is usually strongly ribbed. Most of the galls arise from the stem, and in one unusual case a cluster of eight or ten galls occurred at the tip of an arrested stem. See New York State Museum Bulletin 175, plate 1, figure 5, for a colored illustration.

Larva. Length 3 mm, pale orange.

Male. Length 2 mm. Antennae as long as the body, sparsely haired, yellowish gray; 20 segments, the fifth with a stem two-

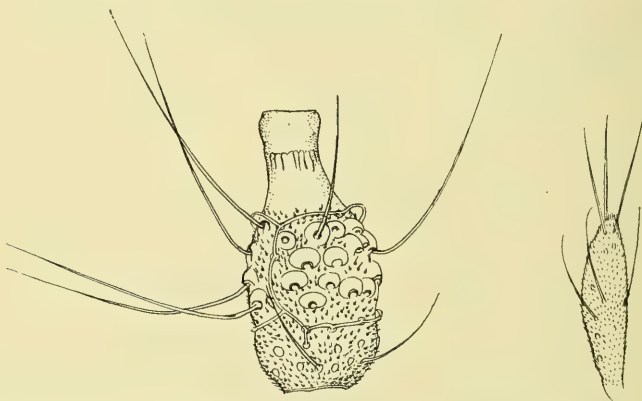


Fig. 67 *Rhopalomyia fusiformis*; fifth antennal segment of male and palpus, enlarged (original)

thirds the length of the basal enlargement. Palpi composed of one rather stout, elongate segment slightly enlarged at the distal third. Mesonotum light brown, submedian lines yellowish, uniting posteriorly in a median yellowish area. Scutellum fuscous yellowish with sparse apical setae, postscutellum yellowish brown. Abdomen dark fuscous yellowish, slightly darker basally, sparsely clothed with fine, fuscous hairs. Genitalia very dark. Wings (Plate 17, figure 3), subhyaline, costa yellowish brown; halteres pale yellowish basally, fuscous apically. Legs nearly uniform yellowish fuscous, distal tarsal segments sometimes variably tinged with pale

carmine; claws slender, strongly curved. Genitalia; basal and terminal clasp segments stout; dorsal plate broad, deeply incised; ventral plate broad, tapering, slightly emarginate. Harpes indistinct, the distal portion curved laterally, broadly rounded posteriorly.

Female. Length 3 mm. Antennae extending to the fourth abdominal segment, sparsely haired, pale yellowish, 18 segments, the fifth subsessile. Palpi; one long, slightly curved, irregular segment; face fuscous yellowish. Mesonotum brown, submedian lines fuscous yellowish. Scutellum fuscous yellowish, darker laterally with sparse median hairs, postscutellum dark brown. Abdomen reddish brown, incisures and pleurae reddish, dorsal sclerites thickly clothed with fine, ferruginous hairs; terminal segments yellowish. Wings subhyaline, costa dark brown; halteres yellowish transparent basally, fuscous apically. Legs nearly uniform dark brown; claws heavy, strongly curved, simple. Ovipositor moderately long, terminal lobes slender, broadly rounded.

Another female reared from this gall has the median mesonotal brownish stripe shorter than the sublateral ones. The scutellum has a patch of long, black setae on each side. The abdomen is sparsely clothed with coarse, black hairs. The halteres are dark to the basal third where there appears to be a tuft of black setae. Coxae whitish translucent. Type Cecid. a1150.

***Rhopalomyia californica* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 364, 366

This species was reared February 1, 1904 by Mr M. A. Knickerbocker from Baccharis and sent to the Bureau of Entomology, United States Department of Agriculture. Apparently the same species was taken in Alameda county, California, on *B. pilularis* in September, presumably in 1885, and others reared from the flowers of this plant April 25, 1886.

Male. Length 2 mm. Antennae about as long as the body, thickly haired, light yellowish brown, 18 or 19 segments, the fifth with a stem as long as the basal enlargement, which latter has a length one-half greater than its diameter and tapers somewhat at each extremity; terminal segment greatly produced, cylindric, with a length about four times its diameter, tapering, obtuse. Palpi; a single short, stout, segment, tapering at both extremities. Mesonotum dark reddish brown. Scutellum reddish brown and yellowish, postscutellum dark brown. Abdomen thickly, haired, reddish brown. Wings hyaline, costa light brown; halteres yellowish transparent. Legs a variable light brown; claws long, slender, evenly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment long, slender; dorsal plate short,

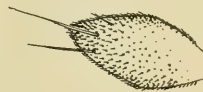


Fig. 68 *Rhopalomyia californica*; palpus, enlarged (original)

broad, deeply and triangularly incised; ventral plate broad at base, tapering, nearly truncate. Harpes long, convolute, narrowly rounded.

Female. Length 3 mm. Antennae extending to the fourth abdominal segment, sparsely haired, light brown; 18 segments, subsessile, the fifth with a length nearly three times its diameter, tapering at both extremities; terminal segment produced, with a length about two and one-half times its diameter, tapering, obtuse, sometimes partly fused with the preceding. Ovipositor about half the length of the abdomen, the terminal lobes long, slender, tapering, narrowly rounded. Other characters practically as in the opposite sex. Type Cecid. 1003.

***Rhopalomyia baccharis* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 364, 365

This form, closely related to the preceding, was reared December 17 to 23, 1885, from stem galls on *Baccharis pilularis*.

Male. Length 2 mm. Antennae about as long as the body, rather thickly haired, light yellowish brown, presumably 19 segments, the fifth with a stem as long as the basal enlargement, which latter has a length one-half greater than its diameter. Palpi; the first segment rather stout, expanding distally, with a length over two times its diameter, the second longer than the first, tapering from its basal extremity to an acute apex. Mesonotum dark reddish brown. Scutellum reddish brown and yellowish, postscutellum dark brown. Abdomen rather thickly haired, reddish brown. Wings hyaline, costa yellowish brown. Halteres yellowish transparent. Legs a variable brown; claws long, slender, strongly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment short, broad; terminal clasp segment short, stout, tapering; dorsal plate very short, broadly and triangularly emarginate; ventral plate broad at base, tapering, roundly emarginate. Harpes very broad, somewhat convolute, obliquely or roundly truncate, with a chitinous tubercle at the posterior internal angle.

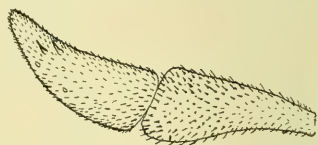


Fig. 69 *Rhopalomyia baccharis*; palpus, enlarged (original)

Female. Length 2.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, yellowish brown; 19 segments, subsessile, the fifth with a length about three times its diameter, the extremities somewhat rounded; terminal segment with a length about four times its diameter, tapering, subacute. Palpi; the first segment stout, roundly pyriform, the second stout, with a length three times its diameter, obtuse. Ovipositor about one-half the length of the abdomen, the terminal lobes long, slender, tapering, narrowly rounded. Type Cecid. 982.

***Rhopalomyia thompsoni* Felt**

- 1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 159
 1908 ————— N. Y. State Mus. Bul. 124, p. 365, 366
 1909 ————— Ottawa Nat., 22: 249

This species was collected and reared by the late Dr M. T. Thompson of Clark University, Worcester, Mass., from a globular or ovoid, fleshy gall on the root stock of *Solidago*, probably *S. juncea*.

Gall. The galls (plate 11, figure 2) have been described by Doctor Thompson as solitary or clustered, ovoid, fleshy, the flesh very spongy and easily torn with the fingers. The larval cells are thin with a scarcely perceptible wall vertically and one to eight occur in a gall. The growth of the plant lifts the gall above the surface of the ground, at which time its skin bursts and it becomes foliated.

Male. Length 2.5 mm. Antennae nearly as long as the body, sparsely haired, pale yellowish, the basal ones reddish, the distal segments tinged with reddish; 19 segments, the fifth with a stem

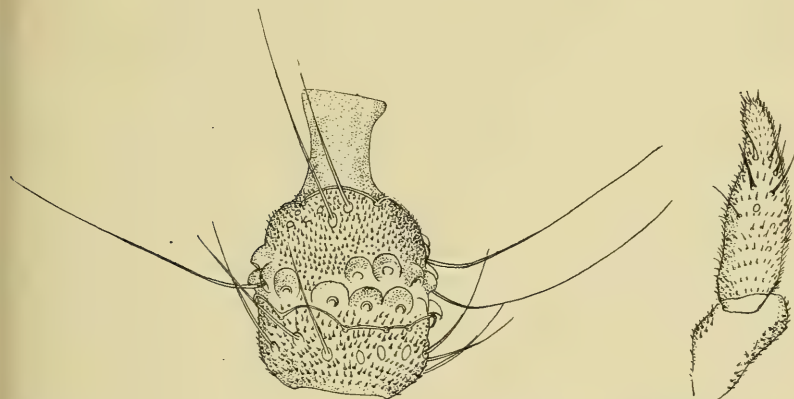


Fig. 70 *Rhopalomyia thompsoni*; fifth antennal segment of male and palpus, enlarged (original)

three-fourths the length of the basal enlargement, which latter has a length one-fourth greater than its diameter; terminal segment variable, usually narrowly oval. Palpi; the first segment rather indistinct, subquadrate, the second long, tapering, slightly curved. Mesonotum dark reddish, submedian lines sparsely clothed with fine setae. Scutellum pale salmon, postscutellum dark brown. Abdomen a deep brick red with heavy bands of black scales, genitalia fuscous. Wings hyaline, costa reddish brown. Halteres yellowish transparent. Legs mostly black, the coxae and base of femora a variable yellowish; claws long, strongly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment long, stout, with a

conspicuous lobe at the internal distal angle; terminal clasp segment long, stout, swollen near the middle; dorsal plate very broad, short, broadly and triangularly emarginate; ventral plate long, broad, deeply and triangularly emarginate.

Female. Length 4 mm. Antennae extending to the third abdominal segment, sparsely haired, yellowish, the distal and basal segments tinged with red; 18 segments, the fifth subsessile, with a length about twice its diameter; terminal segment produced, narrowly oval. Palpi; the first segment rather stout, irregularly subquadrate, the second obconic, curving, acute; face fuscous. Mesonotum dark brown or black, submedian lines indistinct. Scutellum a dark reddish brown, postscutellum fuscous. Abdomen a very dark brown or black, the incisures a deep intense red; costa dark brown. Legs mostly black, the coxae and base of femora yellowish; claws rather long, strongly curved. Ovipositor nearly as long as the abdomen, the terminal lobes long, slender, irregularly rounded. Type Cecid. 1100.

This may prove to be a small form of *R. hirtipes* O. S.

***Rhopalomyia abnormis* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 365

The male described under this name was taken in a trap lantern at Huguenot Park, N. Y., July 14, 1906. Nothing is known concerning its life history.

Male. Length 2 mm. Antennae about as long as the body, sparsely haired, dark brown; 19 segments, the fifth with a stem as long as the basal enlargement, which latter has a length a little greater than its diameter, rounded at the extremities; terminal



Fig. 71 *Rhopalomyia abnormis*; palpus, enlarged (original)

segment produced, narrowly rounded. Palpi; one long, slender segment, swollen near the middle, irregularly curved and tapering, subacute. Mesonotum reddish brown. Scutellum reddish, postscutellum yellowish brown. Abdomen dark brown, thickly clothed with fine hairs. Wings hyaline, costa light brown; halteres pale reddish. Legs a nearly uniform dark brown; claws long, slender, evenly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment long, swollen near the middle; dorsal plate short, broad, deeply and triangularly incised; ventral plate long, tapering, roundly emarginate. Harpes long, broad, convolute, irregularly rounded.

This specimen has a number of the terminal segments of one antenna fused to form a long, uniform mass with a length approximately six times its diameter; the apex narrowly rounded. Type Cecid. 580.

***Rhopalomyia truncata* Felt**

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 365

This species was taken at Los Angeles, Cal., by Mr D. W. Coquillett. It is numbered 162.

Male. Length 2.25 mm. Antennae extending to the fourth abdominal segment, thickly haired, fuscous yellowish; 18 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment reduced, narrowly oval. Palpi; one short, rather slender segment having a length about twice its diameter. Thorax and abdomen a nearly uniform dark reddish brown. Mesonotum and scutellum a nearly uniform dark reddish brown, the latter with a few coarse setae apically, postscutellum and abdomen a nearly uniform dark reddish brown, the latter thickly clothed with long, yellowish setae. Wings hyaline, costa light brown. Halteres yellowish basally, fuscous apically. Legs pale yellowish straw; claws long, slender, evenly curved, the pulvilli longer than the claws. Genitalia; basal and terminal clasp segments short, stout; dorsal plate long, broad, deeply and triangularly emarginate; ventral plate long, broad, broadly and slightly emarginate. Harpes short, stout, convolute, obliquely truncate. Type Cecid. 1050.

***Rhopalomyia astericaulis* Felt**

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 159

1908 ————— N. Y. State Mus. Bul. 124, p. 365

This species was reared by the late Dr M. T. Thompson of Clark University, Worcester, Mass., from an oval, twig gall on aster. A specimen was secured at Wood's Holl, Mass., the flies issuing

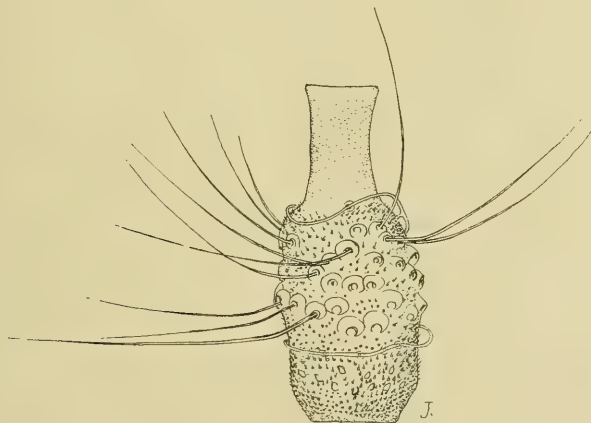


Fig. 72 *Rhopalomyia astericaulis*; fifth antennal segment of male, enlarged (original)

July 13th. Doctor Thompson states that these aster galls are special favorites with inquilines, and adds that he has nearly always found two distinct larvae in the stem gall of *Aster novae-angliae*. The insect obtained most abundantly from this gall was determined as *Neolasioptera ramuscula* Beutm. It is possible that the *Rhopalomyia* is an inquiline, since it occurred in very small numbers.

Male. Length 2.5 mm. Antennae probably extending to the fourth abdominal segment, sparsely haired, dark brown; 18 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length twice its diameter; terminal segment with the basal portion produced, narrowly oval, acute distally. Palpi; a single rather stout, fusiform segment. Mesonotum reddish brown, darker laterally, the submedian lines thickly clothed with long hairs. Scutellum fuscous yellowish, postscutellum yellowish. Abdomen reddish brown with the segments margined posteriorly with long hairs. Wings hyaline, costa dark brown; halteres whitish transparent basally, fuscous apically. Legs a variable dark brown; claws slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment long, greatly swollen; dorsal plate very short, broad, slightly, broadly and triangularly emarginate; ventral plate long, stout, subtruncate or slightly emarginate. Harpes stout, the dorsal margin strongly chitinized, irregularly rounded. Type Cécid. c1107a.

Rhopalomyia bulbula Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 365, 366

1909 ——— Ottawa Nat., 22: 249

The gall of this species occurs on goldenrod near the ground, it resembling very much small bulblets attached to the side of the plant. It was collected and midges reared by the late Dr M. T. Thompson of Clark University, Worcester, Mass., who states that the flies appear very similar to those of *R. thompsoni*, though they are paler and less hairy. It may prove identical with *R. hirtipes* O. S.

Gall. The gall is about 6 mm long, 2.5 mm in diameter, irregularly cylindric, slightly curved and usually green with darker stripes. It is clustered at the surface of the ground and is a typical budlike growth. (Plate 11, figure 1.)

Male. Length 2.5 mm. Antennae as long as the body, sparsely haired, pale yellowish; 18 segments, the fifth with a stem about three-fourths the length of the basal enlargement, which latter tapers basally and apically, has a length about one-half greater than its diameter; terminal segment slightly reduced, broadly oval. Palpi; probably one segment; face fuscous yellowish. Mesonotum dark brown, the rather distinct submedian lines and posterior median area yellowish.

Scutellum fuscous yellowish, postscutellum yellowish. Abdomen fuscous yellowish, sparsely clothed with fine hairs, genitalia darker. Wings hyaline, costa light brown; halteres whitish transparent. Legs a nearly uniform fuscous yellowish; claws long, slender, strongly curved, the pulvilli a little longer than the claws. Genitalia; basal clasp segment short, stout; terminal clasp segment long, stout; dorsal plate short, broad, apparently broadly rounded; ventral plate longer, tapering, broadly truncate. Harpes long, stout, excurved, narrowly rounded.

Female. Length 3 mm. Antennae extending to the sixth abdominal segment, sparsely haired, pale yellowish; 18 segments, the fifth with the basal enlargement having a length about twice its diameter; terminal segment prolonged, slightly constricted near the distal third, narrowly rounded. Palpi; a single stout, long, irregularly fusiform segment bearing a few coarse setae; face fuscous yellowish. Mesonotum dark brown, the submedian lines indistinct. Scutellum reddish brown, postscutellum pale yellowish, fuscous distally. Abdomen pale yellowish with the dorsal sclerites distinctly fuscous, almost dark brown, ovipositor pale orange or yellowish, probably nearly as long as the body, the terminal lobes long, broad, slightly constricted at the base, broadly rounded. Described from alcoholic specimens. Type Cecid. 1115.

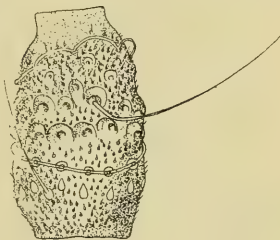


Fig. 73 *Rhopalomyia bulbula*; fifth antennal segment of female, enlarged (original)

Rhopalomyia pini Felt

1907 Felt, E. P. N. Y. State Mus. Bul. 110, p. 120 (separate, p. 24)

1908 ——— N. Y. State Mus. Bul. 124, p. 365

This species was taken at Albany, N. Y., June 4, 1906 flying to a white pine.

Male. Length 2.5 mm. Antennae probably nearly as long as the body, thickly white haired, light yellowish; 18 segments, the fifth with a stem three-fourths the length of the basal enlargement; terminal segment produced, suboval. Palpi; composed of one long, subquadrate segment, slightly expanded distally. Face dark brown. Mesonotum reddish brown, the submedian lines with slaty hairs. Scutellum yellowish brown, postscutellum reddish brown. Abdomen yellowish brown, thickly clothed with slaty hairs. Wings hyaline, costa dark brown. Halteres very long, slender, yellowish transparent basally, fuscous apically. Legs slaty brown; claws slender, uniformly curved. Genitalia; basal clasp segment long, stout; terminal clasp segment large, rounded, swollen at the distal third; dorsal plate broad, deeply and triangularly emarginate; ventral plate broadly rounded. (Plate 18, figure 2.) Harpes stout, broadly rounded. Type Cecid. 1116.

Rhopalomyia gnaphalodis Felt

1911 Felt, E. P. Econ. Ent. Jour., 4: 484

This form was reared April 25-29, 1910 by Prof. T. D. A. Cockrell, Boulder, Col., from a woolly polythalamous gall on *Artemisia gnaphalodes*.

Gall. An irregular, lobulate, polythalamous swelling 1 cm in diameter and 1.3 cm long. The surface is irregularly wrinkled and thickly clothed with short, white pubescence.

Exuviae, protruding from a circular exit hole, whitish transparent.

Rhopalomyia pedicellata Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 365, 366

1909 ———— Ottawa Nat., 22: 248, 249

1910 Stebbins, F. A. Springf. Mus. Nat. Hist. Bul. 2, p. 53 (*Cecidomyia euthamiae* Stebbins)

This species resembles *R. fusiformis* both in the form of the gall and the general appearance of the adult. The gall, however, is easily distinguished by the long stem or pedicel which is about one-half the length of the deformity. The galls occur on the narrow-leaved solidago, *Solidago graminifolia*, the earlier ones become fully developed about the middle of July and others may be found from that date to the end of the summer. This species is rather common in the vicinity of Albany.

Gall. The gall is about 2 cm long, the stem being .6 or .7 cm in length, while the slender, enlarged, fusiform portion is 1.3 to 1.4 cm long. The latter is strongly ribbed, deep purplish green at the tip. It frequently arises from the edge of the leaf, occasionally from the flat surface of either the leaf or stem. The interior walls are succulent when fresh, becoming mealy after drying. A single whitish larva some 3 mm long occurs in each gall. See New York Museum Bulletin 175, Plate 1, figure 6, for a colored illustration.

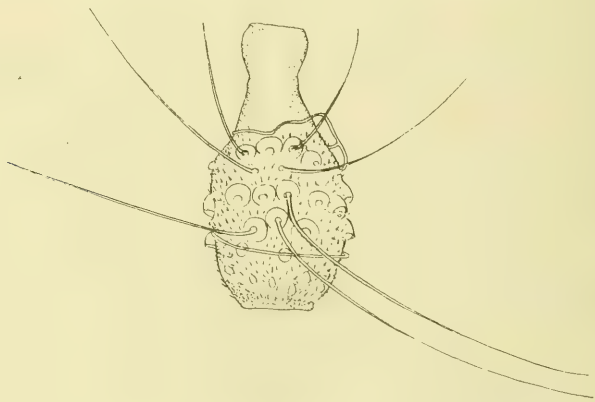


Fig. 74 *Rhopalomyia pedicellata*; fifth antennal segment of male, enlarged (original)

Male. Length 2 mm. Antennae nearly as long as the body, sparsely haired, light fuscous yellowish; the terminal and basal segments yellowish; 19 segments, the fifth with a stem one-third the length of the basal enlargement, which latter has a length one-half greater than its diameter; the two terminal segments rather closely fused, the distal one narrowly rounded. Palp; one rather long, slender, acute segment; face fuscous yellowish. Mesonotum dark fuscous yellowish, the submedian lines lighter, sparsely haired. Scutellum light fuscous yellowish with coarse setae apically, postscutellum darker. Abdomen rather thickly clothed with fuscous hairs, fuscous yellowish, the basal segments and genitalia somewhat darker. Wings hyaline, costa dark brown. Halteres yellowish basally, fuscous apically. Coxae, femora and tibiae mostly fuscous yellowish, tarsi a little darker; claws long, slender, strongly curved apically, the pulvilli a little longer than the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment long, stout; dorsal plate short, broad, deeply and triangularly emarginate; ventral plate long, tapering, broadly and roundly emarginate. Harpes broad, long, irregularly rounded.

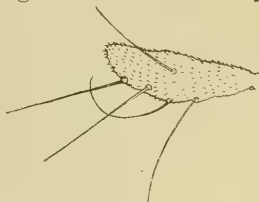


Fig. 75 *Rhopalomyia pedicellata*; male palpus, enlarged (original)

Female. Length 3 mm. Antennae extending to the fourth abdominal segment, sparsely haired, light fuscous yellowish, tinged with reddish apically; 18 or 19 segments, the fifth subsessile with a length two and one-half times its diameter; terminal segment greatly prolonged, obtusely rounded. Mesonotum reddish brown, the submedian lines yellowish, sparsely haired. Scutellum reddish yellow with numerous fuscous setae apically, postscutellum dark red. Abdomen thickly clothed with fuscous hairs, especially laterally, dark red, the incisures and pleurae yellowish red, ovipositor pale yellowish. Wings hyaline, costa dark brown. Ovipositor about as long as the abdomen, the terminal lobes long, tapering, narrowly rounded. Otherwise nearly as in the male.

Two females reared July 25th are distinctly darker than that described above, the antennae being reddish yellow, mesonotum shining dark red, submedian lines thickly haired. Scutellum and postscutellum a light reddish salmon, abdomen thickly clothed with fuscous hairs, the incisures and pleurae dark red. Legs nearly black. Type Cecid. a1650.

Rhopalomyia palustris Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 365

This female was taken by sweeping sweetflag at Nassau, N. Y., June 7, 1907.

Female. Length 2 mm. Antennae nearly as long as the body, sparsely haired, fuscous yellowish; 19 segments, the fifth with a stem

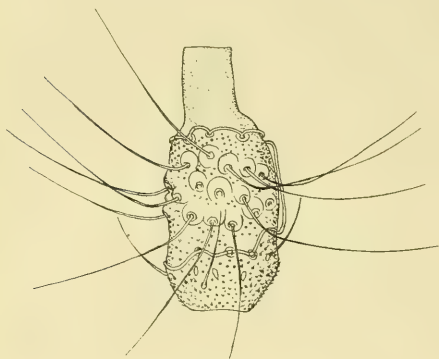


Fig. 76 *Rhopalomyia palustris*;
fifth antennal segment of male, enlarged
(original)

one-third the length of the basal enlargement, which latter has a length about twice its diameter; terminal segment produced, narrowly oval. Palpi; one subfusiform segment having a length about three times its diameter; face fuscous. Mesonotum dark brown, the submedian lines sparsely haired. Scutellum reddish brown, postscutellum dark brown. Abdomen a dark reddish brown, the fifth and sixth segments somewhat lighter, ovipositor pale orange.

Wings hyaline, costa dark brown. Halteres yellowish basally, fuscous apically. Legs a nearly uniform fuscous yellowish; claws long, slender, slightly curved, the pulvilli longer than the claws. Ovipositor about two-thirds the length of the abdomen, the terminal lobes long, slender, irregularly rounded. Type Cecid. 1208.

Rhopalomyia lobata Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 366

1909 ———— Ottawa Nat., 22: 249

This species was reared July 17, 1907 from a subglobular gall occurring near the top of a slender stem of *Solidago graminifolia* taken at West Nyack, N. Y.

Gall. The gall is subglobular, inclosed in several whorls of distorted leaflets or bracts and about 1.5 cm in diameter. The interior is composed of spongy material inhabited by several larvae.

Female. Length 3.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, light fuscous yellowish; 19 segments, the fifth subsessile, with a length fully twice its diameter; terminal segment greatly produced, tapering, narrowly rounded. Palpi; one stout, narrowly oval segment tapering irregularly; face fuscous yellow. Mesonotum reddish brown, the submedian lines rather thickly clothed with fuscous hairs. Scutellum dark reddish brown, postscutellum dark carmine. Abdomen rather thickly clothed with fine hairs, dark brown, the incisures and pleurae dark carmine. Wings hyaline, costa dark brown; halteres yellowish basally, fuscous apically. Coxae and base of femora pale reddish orange, the remainder of the legs a very dark brown, the tarsi nearly black; claws long, stout, strongly curved, the pulvilli longer than the

claws. Ovipositor about two-thirds the length of the abdomen, the terminal lobes very long, slender, narrowly rounded. Type Cecid. a1647.

Rhopalomyia asteriflorae Felt

1907 Felt, E. P. New Species of Cecidomyiidae II, p. 17-18

1908 ————— N. Y. State Mus. Bul. 124, p. 298, 366

This species was reared at Albany, N. Y., from stunted, abnormally bunched heads of *Aster paniculata*. Two females were obtained September 25, 1907 and despite careful examination of the material in the breeding jar, nothing was found to indicate the part from which the insects emerged. *Torymus* species was reared apparently from this gall.

Female. Length 2.5 mm. Antennae extending to the third abdominal segment, sparsely haired, pale fuscous yellowish; 19 segments, the fifth subsessile, with a length about two and one-half times its diameter; terminal segment partly fused with the preceding, greatly prolonged, tapering, obtuse. Palpi; one long, irregularly fusiform segment with a length about twice its diameter. Mesonotum dark brown, the submedian lines sparsely haired. Scutellum dark brown with numerous coarse setae apically, postscutellum fuscous orange. Abdomen reddish brown, the incisures and pleurae dark orange, ventral sclerites dark brown. Ovipositor fuscous yellowish. Wings hyaline, costa dark brown; halteres pale yellowish basally, fuscous apically. Coxae and base of femora fuscous yellowish, the distal portion of femora, tibiae and tarsi fuscous; claws rather long, slender, strongly curved, the pulvilli as long as the claws, the ovipositor probably as long as the body, the terminal lobes long, broad, narrowly rounded. Type Cecid. a1757.

Rhopalomyia bigelovioides Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 365, 367

This species was reared by D. W. Coquillett in February from galls on *Bigelowia* taken at Los Angeles, Cal.

Gall. The gall on the pin bearing one of the specimens is nearly 1 cm long, .4 cm in diameter, irregularly oval and evidently a deformed seed.

Male. Length 2.5 mm. Antennae extending to the third abdominal segment, sparsely haired, light brown; 17 segments, the fifth with a stem one-third the length of the basal enlargement, which latter has a length one-half greater than its diameter and tapers slightly at both extremities; terminal segment prolonged, with a length nearly four times its diameter, tapering, obtuse. Palpi; one stout segment with a length over four times its diameter, tapering, acute. Genitalia; basal and terminal clasp segments long, stout; ventral plate long, narrow, deeply and triangularly emarginate; harpes broad, convolute, irregularly rounded. Color and other characters nearly as in the female.

Female. Length 2.5 mm. Antennae probably extending to the third abdominal segment, sparsely haired, yellowish brown; 18 seg-



Fig. 77 *Rhopalomyia bigelovioides*; fifth antennal segment and palpus, (a) of female (b) of male, enlarged (original)

ments, the fifth with a length two and one-half times its diameter, tapering at each extremity; terminal segment reduced, broadly oval. Mesonotum shining dark brown, submedian lines sparsely haired.

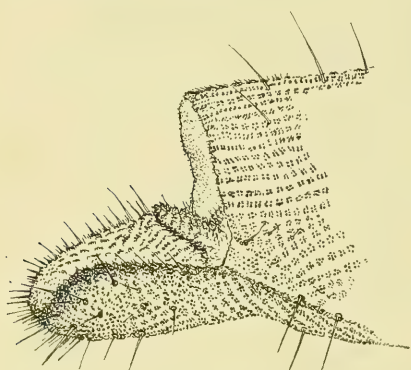


Fig. 78 *Rhopalomyia bigelovioides*; tip of ovipositor, lateral view, enlarged (original)

Scutellum reddish brown, postscutellum a little lighter. Abdomen sparsely haired, light brown, the terminal segment somewhat darker, venter a little lighter. Wings hyaline, costa light brown; halteres yellowish brown basally, yellowish white apically. Legs a nearly uniform light brown; claws long, stout, evenly curved, the pulvilli one-half longer than the claws. Ovipositor about two-thirds the length of the abdomen, the terminal lobes long, narrowly oval. Type Cecid. 940.

Rhopalomyia pilosa Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 366, 367

This species was reared by Mr T. N. Willing of Medicine Head, North West Territory, from a large, densely woolly apical gall, presumably on *Antennaria*.

Gall. The galls are white, woolly aggregations with nearly snow-white fibers about 5 mm long, radiating from rather hard, thin-shelled cavities inhabited by the larvae.

Male. Length 2 mm. Antennae probably as long as the body, sparsely haired, brown, the stems yellowish transparent; presumably 17 segments, the fifth with a stem as long as the basal enlarge-



Fig. 79 *Rhopalomyia pilosa*; fifth antennal segment of male and palpus, enlarged (original)

ment, which latter has a length nearly twice its diameter. Palpi; one long, somewhat fusiform segment, tapering, acute. Mesonotum fuscous yellowish, the submedian lines lighter, sparsely haired. Scutellum fuscous yellowish, postscutellum a little lighter. Abdomen fuscous yellowish, somewhat darker at the extremities. Wings hyaline, costa light brown; halteres yellowish transparent. Legs variably fuscous yellowish; claws long, slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout, greatly swollen near the middle; dorsal plate long, broad, deeply and triangularly emarginate; ventral plate short, broad, broadly and rather roundly emarginate. Harpes long, stout, tapering, irregularly rounded, tuberculate.

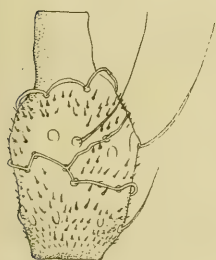


Fig. 80 *Rhopalomyia pilosa*; fifth antennal segment of female, enlarged (original)



Fig. 81 *Rhopalomyia pilosa*; lateral view of the tip of the ovipositor, enlarged (original)

Female. Length 2 mm. Antennae probably nearly as long as the body, sparsely haired, fuscous yellowish; 17 segments, the fifth with a stem one-fourth the length of the basal enlargement, which latter has a length nearly twice its diameter; terminal segment produced, narrowly oval. Mesonotum dark brown, the submedian lines sparsely clothed with fine hairs. Scutellum yellowish transparent, postscutellum brown. Abdomen a variable fuscous yellowish, darker at the extremities. Wings hyaline, costa light brown. Ovipositor stout, nearly as long as the abdomen, the terminal lobes short, stout, tapering, narrowly rounded. Type Cecid. 1215.

Rhopalomyia cruziana Felt

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 366, 367

1909 ——— Ottawa Nat., 22: 246

The galls of this species occur on the flowers of *Solidago* and were collected in the Santa Cruz mountains, California, during August, 1889, the adults issuing before May 1890.

Male. Length 1.5 mm. Antennae nearly as long as the body, sparsely haired, light brown; 17 segments, the fifth with a stem as long as the basal enlargement, which latter has a length one-half greater than its diameter; terminal segment greatly produced, tapering, narrowly rounded. Palpi; the first segment very broad, irregularly subglobular, the second slender, with a length about twice its diameter, obtusely rounded. Mesonotum shining brown, the submedian lines indistinct. Scutellum yellowish brown, postscutellum a little lighter. Abdomen sparsely clothed with fine hairs, light brown. Wings hyaline, costa light brown. Halteres pale yellowish, yellowish white distally. Legs a variable yellowish straw, the distal tarsal segments light brownish; claws long, slender, evenly curved, the pulvilli longer than the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout; dorsal plate long, broad, deeply and triangularly emarginate; ventral plate long, broad, broadly emarginate. Harpes long, convolute, irregularly rounded.

Female. Length 2.25 mm. Antennae extending to the third abdominal segment, sparsely haired, light yellowish brown; 15 seg-



Fig. 82 *Rhopalomyia cruziana*; fifth antennal segment, palpus and claw of female, enlarged (original)

ments, the fifth with a length three-fourths greater than its diameter, narrowly rounded at the extremities; terminal segment produced, tapering, obtusely rounded. Palpi; the first segment short, stout, swollen distally, the second hardly longer than the first, more slender, tapering, narrowly rounded. Ovipositor about as long as the body,

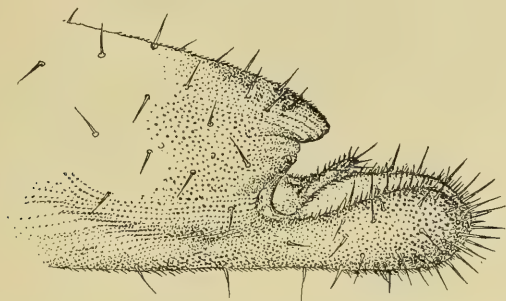


Fig. 83 *Rhopalomyia cruziana*; tip of ovipositor, enlarged (original)

the terminal lobes long, narrowly oval. Other characters practically as in the opposite sex. Type Cecid. 942.

***Rhopalomyia lanceolata* Felt**

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 367, 368

1909 ———— Ottawa Nat., 22: 247

This species was reared by Dr James G. Needham from what he designates as a spongy gall on the narrow-leaved golden-rod, *Solidago graminifolia*, presumably from Lake Forest, Ill.

Gall. The gall closely resembles that made by *Asphondylia monacha* O. S. and it may be that this species is an inquiline.

Male. Length 2.5 mm. Antennae nearly as long as the body, sparsely haired, light yellowish; 17 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter has a length twice its diameter; terminal segment reduced, narrowly oval, subacute distally. Palpi; one long, stout segment having a length twice its diameter. Mesonotum light brown, the submedian lines broad, yellowish, the posterior median area and scutellum yellowish, postscutellum dark brown. Abdomen light yellowish, lighter than in the female. Wings hyaline, costa light brown; halteres pale yellowish. Legs whitish transparent; claws long, slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout, swollen near the middle; dorsal plate very short, broad, broadly and triangularly emarginate; ventral plate long, broad, tapering, slightly emarginate. Harpes large, broad, convolute, narrowly rounded.

Female. Length 3 mm. Antennae extending to the third abdominal segment, sparsely haired, pale yellowish; 15 segments, subsessile, the fifth with a length two and one-half times its diameter,

tapering; terminal segment slightly reduced, tapering, narrowly rounded. Ovipositor probably as long as the abdomen, the terminal lobes slender, with a length twice the diameter, narrowly rounded. Otherwise nearly as in the male. Type Cecid. 784.

Rhopalomyia antennariae Whlr.

1891 **Riley, C. V. & Howard, L. O.** Ins. Life, 4: 125 (*Synopeas antennariae* Ashm. reared, *Cecidomyia*)

1899 **Wheeler, W. M.** Wis. Nat. Hist. Soc. Proc., p. 209-12 (*Cecidomyia*)

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 367

This species was first reared by Dr W. M. Wheeler in the spring of 1888 and 1889 and referred to the genus *Cecidomyia*. The gall, he states, is produced from a puncture of the terminal bud of the plantlet early in April, the insects probably appearing soon after the snow melts. Pupation takes place the first week in May, the change from the larva to the pupa being very gradual. The adults appear about the middle of May and are not very active. A number of galls were sent by Doctor Wheeler to the Bureau of Entomology, Washington, D. C., and adults bred therefrom the last of May, together with several parasites, the occurrence of *Platygaster* and a *Pteromalid* being recorded. The detailed descriptions of adults given below are based on material reared at Washington. Doctor Wheeler states that one female kept in confinement deposited her orange-colored ova in the leaf axil of a healthy green shoot of a plant, most of the terminal buds of which had been previously converted into galls. Doctor Wheeler states that an insect may deposit from one to fifteen eggs in each bud, an average of three to seven and that numerous larvae are found imbedded in the woolly center of the gall and, though near each other, usually isolated by filaments of matted hairs. This species and the associated *Asphondylia antennariae* were so abundant as to seriously affect a large proportion of the host plants, *Antennaria plantaginifolia*.

Gall. The gall, according to Doctor Wheeler, is from about 3 to 5 mm in diameter, corm-shaped and is produced by a check in the growth of the scapelike flower-bearing stem, the sessile leaves of which become somewhat succulent, broader and longer than under normal circumstances, and excepting the tips, which are somewhat recurved, are closely applied to one another like the leaves of an onion. Both surfaces of the component leaves of the gall are covered with woolly hairs, while the parenchyma is more or less discolored with reddish. Frequently all of the terminal buds of a plant are transformed into galls by this insect.

Male. Length 2 to 3 mm. Antennae about as long as the body, thickly haired, light brown; 16 segments, the fifth with a stem about equal the length of the basal enlargement, which latter has a length

about twice its diameter, tapers slightly basally; terminal segment produced, narrowly oval. Palpi; the first segment short, stout, irregularly oval, the second long, slender, tapering; face fuscous yellowish. Mesonotum dark brown. Scutellum and postscutellum reddish brown. Abdomen dark reddish brown. Wings hyaline, costa light brown. Halteres pale yellowish. Legs a variable fuscous yellowish; claws long, slender, evenly curved, the pulvilli longer than the claws. Genitalia; basal and terminal clasp segments long, stout; the latter swollen near the basal third; dorsal plate short, broad, broadly and triangularly incised; ventral plate short, broad, broadly and roundly emarginate.

Female. Length 2.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, pale yellowish; 16 segments, the fifth sessile, with a length about twice its diameter; terminal



Fig. 84 *Rhopalomyia antennariae*; fifth antennal segment and palpus of female, enlarged (original)

segment produced, narrowly rounded apically. Mesonotum dark brown, the sublateral and posterior median areas reddish brown. Scutellum and postscutellum dark brown. Abdomen light brown (in life bright orange red), the basal segment of the ovipositor dark brown, the apical one pale salmon. Ovipositor about as long as the abdomen, the terminal lobes stout, somewhat contracted basally, narrowly rounded, otherwise practically as in the opposite sex. Type Cecid. 960.

Rhopalomyia tridentatae Rubs.

1893 Rubsaamen, E. H. Ent. Nachrichten, 19: 163

This species, according to Rubsaamen, produces a gall on *Artemisia tridentata*, much resembling that made by the

European *Rhopalomyia artemisiae* Bouché on *Artemisia campestris*, namely an oval bud enlargement. Doctor Rubsaamen states that he received galls and flies from Herr Doctor Von Schlechtendal of Halle. There is a gall in the Museum of Comparative Zoology from California which may be referable to this species.

Rhopalomyia grossulariae Felt

1911 Felt, E. P. Econ. Ent. Jour., 4: 347

This was reared from deformed gooseberry buds in May 1911 by J. S. Houser of the Ohio Agricultural Experiment Station. The material was collected at Camp Chase. It approaches in antennal characters the North American *Rhopalomyia tridentatae* Rubs. reared from *Artemisia*, though it is easily distinguished by the uniarticulate palpi.

Rhopalomyia alticola Ckll.

1890 Cockerell, T. D. A. Ent., p. 281 (*Cecidomyia*)

1895 Baker, C. F. Ent. News, 6: 173

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 367

This species produces a globular woolly gall on the branches of *Artemisia* in Colorado. The following descriptions of the adult and gall have been drafted from material kindly put at our disposal by Prof. T. D. A. Cockerell December 17, 1906, the imagoes appearing the middle of the following January.

Gall. The gall is subglobular, grayish, woolly, ranging in diameter from .7 to 1.5 cm. Each is composed of a number of hard, thin walled, narrowly oval cells thickly covered with cottony matter and surrounded with small bracts, the latter also thickly clothed with white down.

Male. Length 2.5 mm. Antennae extending to the third abdominal segment, sparsely haired, reddish brown, 16 or 17 segments; the fifth with a stem one-third the length of the vasiform enlargement. Palpi uniarticulate, the segment long, slender. Face fuscous brown, mesonotum dark brown, submedian lines fuscous, apparently slightly elevated, sparsely clothed with fine hairs. Pleurae mostly light reddish, scutellum and postscutellum dark brown,



Fig. 85 *Rhopalomyia alticola*; gall nearly natural size (original)

the former with a few sparse setae apically. Abdomen sparsely clothed with pale yellowish hairs, a light yellowish brown, the basal

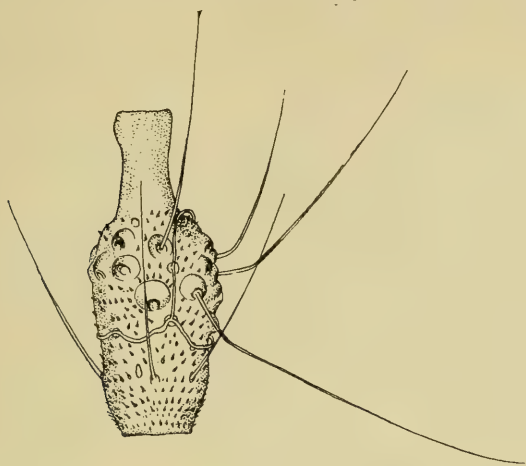


Fig. 86 *Rhopalomyia alticola*; fifth antennal segment of male, enlarged (original)

segment very dark brown, the genitalia reddish brown. Wings hyaline, costa dark brown; halteres yellowish basally, fuscous apically, the distal portion of the stem reddish brown. Legs a nearly uniform fuscous reddish brown, the coxae and distal tarsal segments darker; caws long, stout, evenly curved. Genitalia; basal clasp segment long, stout; terminal clasp segment very short, stout; dorsal plate short, broad, deeply and narrowly incised; ventral plate broad, broadly and triangularly incised.

Female. Length 2.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, dark red, 16 segments; the fifth with a stem one-fourth the length of the basal enlargement; terminal segment slightly prolonged, obtuse. Palpi uniaarticulate, the segment long, stout. Mesonotum brownish black, submedian lines sparsely ornamented with yellowish hairs. Scutellum brownish black, post-scutellum dark brown; pleurae reddish with fuscous markings especially on the margins of the sclerites. Abdomen reddish brown, very sparsely clothed with fine hairs, dark reddish ventrally. Ovipositor fuscous yellowish. Legs a variable fuscous yellow, tarsi slightly darker, the tips of the coxae darker; claws rather long, stout, evenly curved. Ovipositor probably about two-thirds the length of the body, the terminal lobe long, broad, obtuse. Type Cecid. 768.

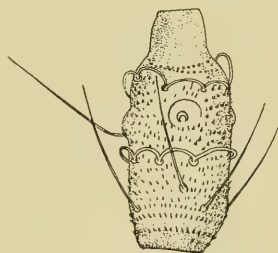


Fig. 87 *Rhopalomyia alticola*; fifth antennal segment of female, enlarged (original)

Rhopalomyia arcuata Felt

1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 158-59

1908 ——— N. Y. State Mus. Bul. 124, p. 367

This species was taken at Albany, N. Y., June 4, 1906 while sweeping *Solidago* and sweet fern.

Male. Length 2 mm. Antennae probably as long as the body, sparsely haired, pale straw; at least 15 segments, the fifth with a stem one-fourth longer than the slightly fusiform basal enlargement. Palpi composed of one rather long, fusiform segment, acute distally. Face dark brown, sparsely clothed with fuscous hairs. Scutellum yellowish brown, sparsely setose apically; postscutellum orange brown. Abdomen thickly clothed with fuscous hairs, dark brown. Wings hyaline, costa light brown. Halteres yellowish transparent basally, fuscous apically. Coxae fuscous yellowish. Legs pale straw, the claws stout, slightly curved. Genitalia; basal clasp segment stout; terminal clasp segment short, stout; dorsal plate short, broad, slightly emarginate. Harpes short, irregular, much convoluted, the curved ventral and posterior margins strongly chitinated. Type *Cecid.* 124.

Rhopalomyia gutierreziae Ckll.

1901 **Cockerell, T. D. A.** Can. Ent., 33: 23 (*Asphondylia*)

1908 **Felt, E. P.** N. Y. State Mus. Bul. 124, p. 367, 368

This species produces a pale green, fusiform or suboval swelling in the flower heads of *Gutierrezia sarothrae*. The gall is about 7 mm long, 3 mm broad and was taken at Las Vegas, N. M., adults appearing October 31st. An examination of the types in the United States National Museum shows that it probably belongs to this genus. Professor Cockerell, writing September 9, 1907, transmits what he considers as probably the same insect taken by Mr Frank Springer on the same plant, the adults appearing at the time of writing and emerging from apparently unmodified florets. Professor Cockerell states that the female he described had 17 antennal segments, while the one transmitted had about 13 or 14 segments. It may be that there are two entirely different insects, in which event this form must be a new species. The following descriptions have been drafted from these specimens, except that certain color characteristics have been taken from Professor Cockerell's original description.

Male. Length 1.5 mm. Antennae extending to the fourth abdominal segment, sparsely haired, pale brown; 15 segments, the fifth with a stem two-thirds the length of the basal enlargement, which latter has a length one-half greater than its diameter and is roundly tapering at both extremities; terminal segment produced,

narrowly oval. Palpi; a single irregular slender segment with a length about four times its diameter. Mesonotum shining fuscous,

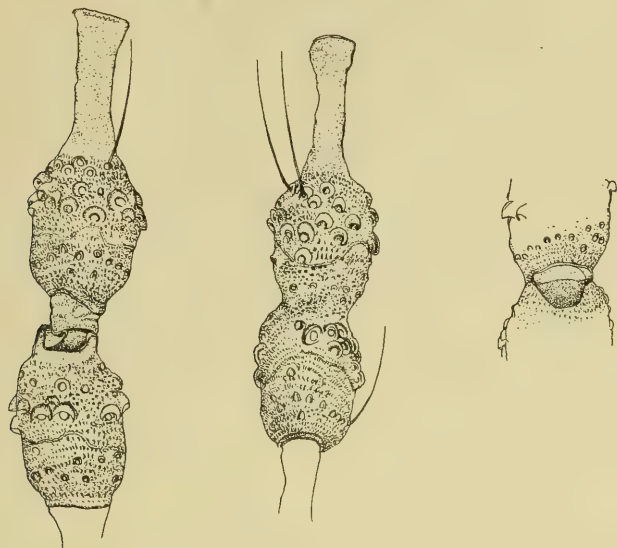


Fig. 88 *Rhopalomyia arcuata*; antennal deformations showing various stages, enlarged (original)

the submedian lines indistinct. Abdomen brown. Wings hyaline, costa pale brown. Halteres yellowish. Femora pale brown, tibiae and tarsi darker; claws long, slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, stout, swollen near the middle; dorsal plate long, broad, apparently divided, the lobes irregularly oval, with an obtuse angular projection; ventral plate apparently long, broad, broadly rounded.

Female. Length 2 mm. Antennae extending to the third abdominal segment, sparsely haired, pale brown; 13 to 14 segments, the fifth sessile, with a length one-half greater than its diameter, somewhat rounded at the extremities; the two terminal segments sometimes fused, the fourteenth prolonged, nearly twice the length of the preceding. Palpi; one stout segment with a length nearly three times its diameter. Mesonotum reddish brown, shining, naked, the submedian and sublateral lines sparsely ornamented with pale hairs. Abdomen nearly naked, bright red (the base frequently fuscous, becoming reddish distally), the ovipositor whitish yellowish. Pulvilli longer than the claws. Ovipositor about one-half the length of the abdomen, stout, the terminal lobes long, slightly contracted at the base, narrowly rounded. Type Cecid. a1742.

***Rhopalomyia bigeloviae* Ckll.**

- 1889 Cockerell, T. D. A. Ent. Month. Mag., 25: 324, 363 (*Cecidomyia*)
 1890 ——— Ent. Month. Mag., 26: 109 (*Cecidomyia*, p. 324; note)
 1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 368

The gall produced by this species was first observed by Professor Cockerell in Colorado during 1889, adults being obtained the latter part of that year and described in 1900. This species was reared from a hollow gall on *Bigelovia*, apparently nothing but females being obtained. It is possible that further study may show *R. bigelovioides* to be but a larger form of this species. For the present it seems advisable to make a distinction between the two. The following characterization of this species is drafted from a specimen received from the United States National Museum and labeled *Cecidomyia bigeloviae*. It is undoubtedly a cotype. It also bore the following labels: "from gall on *Bigelovia*, May 1889. T. D. A. Cockerell, Custer co., Col." A species of *Trypeta* described by Professor Cockerell as *T. bigeloviae* has also been reared from this deformity together with examples of *Anthonomus canus* Lec., a species of *Torymus* and *Eurytoma bigeloviae* Ashm.

The egg of this species has been described by Professor Cockerell, as elongate, with rounded ends, approximately parallel sides and orange contents.

Female. Length 2.5 mm. Antennae extending to the third abdominal segment, sparsely haired, pale yellowish or brownish;

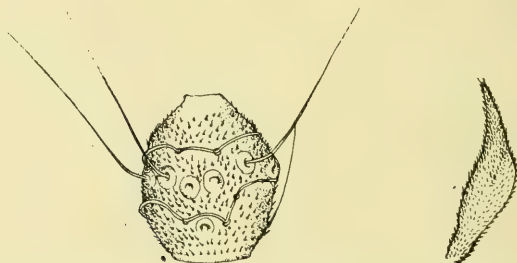


Fig. 89 *Rhopalomyia bigeloviae*; fifth antennal segment and palpus of female, enlarged (original)

15 sessile segments, the fifth with a length one-half greater than its diameter, somewhat rounded at both extremities; terminal segment produced, with a length over three times its diameter. Palpi; one slender, fusiform segment, having a length fully four times its diameter and constricted at the point of insertion, distally tapering, acute. Mesonotum light reddish brown. Scutellum a little darker,

postscutellum reddish brown. Abdomen light yellowish brown (dull pinkish red in life); ovipositor pale yellowish. Wings hyaline, costa light brown. Halteres pale yellowish or whitish, legs mostly yellowish brown; claws long, slender, evenly curved, the pulvilli as long as the claws. Ovipositor about two-thirds the length of the abdomen, the terminal lobes short, stout, narrowly rounded. Type Cecid. 1070.

***Rhopalomyia audibertiae* Felt**

1907 Felt, E. P. New Species of Cecidomyiidae II, p. 18

1908 ——— N. Y. State Mus. Bul. 124, p. 299, 368

This species was reared from a gall on *Audibertia stachyoides* in April.

Male. Length 1.5 mm. Antennae probably nearly as long as the body, sparsely haired, light brown; 14 segments, the fifth with a stem three-fourths the length of the basal enlargement, which latter

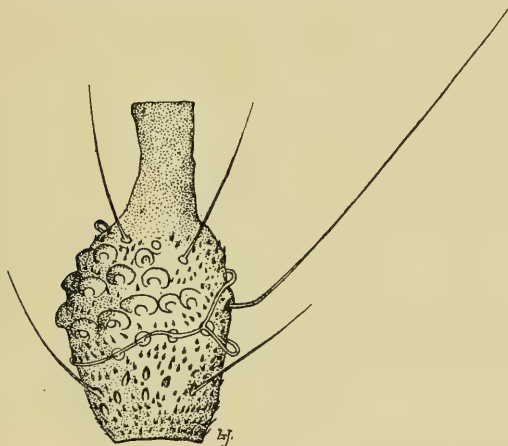


Fig. 90 *Rhopalomyia audibertiae*; fifth antennal segment of male, enlarged (original)

has a length one-half greater than its diameter; terminal segment produced, obtuse. Palpi consisting of one short, stout, irregular segment. Mesonotum dark reddish brown. Scutellum reddish brown. Abdomen dark brown. Wings hyaline, costa light straw. Legs light straw; claws long, stout, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, greatly swollen basally; dorsal plate short, broad, apparently divided; ventral plate short, broad, broadly and roundly emarginate. Harpes short, stout, obliquely truncate and with large, irregular teeth apically.

Female. Length 2 mm. Antennae extending to the base of the abdomen, sparsely haired, light brown; 12 segments, the fifth sessile.

tapering at both extremities and with a length one-half greater than its diameter; terminal segment produced, tapering, narrowly rounded. Palpi; consisting of one short, subglobose segment. Mesonotum dark reddish brown. Scutellum reddish brown. Abdomen dark brown. Halteres yellowish transparent. Legs light straw; claws long, slender, strongly curved, the pulvilli as long as the claws. Ovipositor about two-thirds the length of the body, the terminal lobes short, stout, tapering, narrowly rounded. Type Cecid. 1029.

***Rhopalomyia castaneae* Felt**

1909 **Felt, E. P.** Econ. Ent. Jour., 2: 291

A fuscous orange female was reared June 13, 1908 from the leaf petiole of chestnut, *Castanea dentata*, taken at Stowe, Mass.

Gall. The injury is primarily to the leaf petiole though the affected area may embrace the entire tip of the twig and cause a deformity similar to brussels sprouts.

Female. Length 1.75 mm. Antennae hardly extending to the base of the abdomen, sparsely haired, dark brown, the basal segments yellowish; 12 segments, the fifth with a length one-fourth greater than its diameter, tapering distally; terminal segment slightly produced, tapering to a narrowly rounded apex. Palpi biarticulate; face yellowish. Mesonotum dark brown, the broad submedian lines yellowish, sparsely haired. Scutellum reddish orange, postscutellum reddish brown. Abdomen a deep fuscous orange, sparsely haired, the ovipositor yellowish. Wings almost subhyaline, thickly haired, costa dark brown. Halteres pale orange. Legs mostly dark brown; claws long, slender, evenly curved, the pulvilli distinctly longer than the claws. Ovipositor nearly as long as the abdomen, the terminal lobes long, slender, with a length about five times their diameter. Type Cecid. ai716.

***Rhopalomyia chrysopsidis* Lw.**

1862 **Loew, Hermann.** Mon. Dipt. N. Amer., 1: 203-4 (Cecidomyia)

1893 **Townsend, C. H. T.** Ent. Soc. Wash. Proc., 2: 389 (Cecidomyia)

The gall produced by this species on *Chrysopsis mariana* is apical, light brown, irregular, woolly and about three-fourths of an inch in diameter. The interior consists of many single galls which have no compartments and coalesce here and there, each being conical unless modified by pressure. The gall described by Townsend as cited above, appears to be quite different and, judging from the account, may have produced a species of *Lasioptera*. We have provisionally referred the form described by Loew to *Rhopalomyia*.

Sackenomyia Felt

- 1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 361
1910 Rubsaamen, E. H. Zeitsch. Wissenschaft. Insektenbiol., 15: 337
1911 Felt, E. P. N. Y. Ent. Soc. Jour., 19: 47
1913 Kieffer, J. J. Gen. Insect., fasc. 152, p. 48

This genus is allied to *Rhopalomyia* from which it is easily separated by the heavily chitinized cultriform distal portion of the ovipositor and the bi- or triarticulate palpi. The antennal segments may vary in number from 12 to 22, being sessile in the female and with a short stem in the male. The male genitalia of *S. packardii* are unusually large; the dorsal plate is unique, being broadly rounded and but slightly emarginate, while the ventral plate is long, narrow, deeply and narrowly emarginate, the lobes being long and slender. The type of this genus is *Oligotrophus acerifolius* Felt.

Key to species

- a* Length 1.5 mm; abdomen light yellowish
b 12 subsessile antennal segments, wings rather narrow
acerifolia Felt, C. 38
bb 13-14 antennal segments, fifth of male with a stem as long as the basal
enlargement, wings rather broad; reared from swollen, purplish leaf veins
on *Viburnum dentatum*.....*viburnifolia* Felt, C. ar896
aa Length 2 mm; abdomen yellowish brown; probably 18-22 antennal segments
porterae Ckll., C. 1252
aaa Length, female, 3.5 mm, abdomen dark red, 21 antennal segments; male,
length 2.75 mm, antennal segments 22.....*packardii* Felt, C. ar934

Sackenomyia acerifolia Felt

- 1907 **Felt, E. P.** N. Y. State Mus. Bul. 110, p. 121 (separate, p. 27) (*Oligotrophus*)
 1908 ————— N. Y. State Mus. Bul. 124, p. 361

This small species was taken at Albany, N. Y., May 17, 1906 while sweeping maple and other bushes.

Female. Length 1.5 mm. Antennae not extending to the base of the abdomen, sparsely haired, light brown; 12 segments, the fifth subsessile, subcylindric, slightly rounded in the middle; terminal segment subconic, broadly rounded. Palpi; the first segment slender, with a length nearly four times its diameter, the second subquadrate, with a length one-half greater than its diameter, the third more than twice the length of the second, tapering, acute. Face yellowish. Mesonotum yellowish brown. Abdomen light

yellowish, slightly fuscous apically. Wings hyaline, rather narrow, costa pale straw. Halteres yellowish transparent. Legs, coxae,



Fig. 91 *Sackenomyia acerifolia*; fifth antennal segment and palp, much enlarged (author's illustration)

femora and tibiae yellowish transparent; tarsi dark brown, the anterior with the basal articulations yellow banded, the posterior.

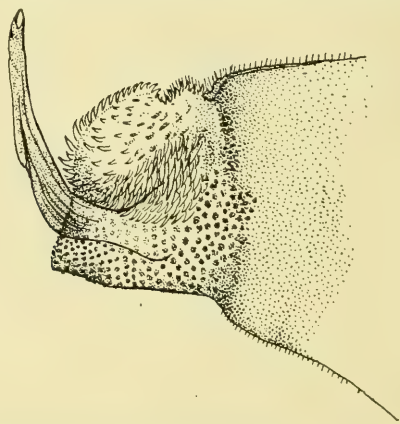


Fig. 92 *Sackenomyia acerifolia*; lateral view of ovipositor, much enlarged (author's illustration)

with the basal tarsal segments yellow; claws stout, simple. Ovipositor short, the distal part cultriform and with a length equal to the diameter of the last abdominal segment. Type Cecid. 38.

***Sackenomyia viburnifolia* Felt**

1909 Felt, E. P. Econ. Ent. Jour., 2: 290

This small, yellowish species was reared in numbers the latter part of April 1909 from purplish vein swellings on arrowwood, *Viburnum dentatum*, collected at Magnolia, Mass., in the

fall of 1908 by Miss Cora H. Clarke and also found at the same time locally abundant in the vicinity of both Albany and Nassau, N. Y.

Gall. The gall, a purplish swelling on both sides of the lateral veins of the leaf, is some 5 mm long, 3 mm in diameter and tapering at both extremities (Plate 16 figure 2). Two galls may occur on one vein and as many as 8 or 10 on a leaf. The larva lies just beneath the vein.

Larva. Length 1.75 mm, whitish, stout, the extremities broadly rounded. Head small; antennae short, stout; breastbone broadly bidentate, disappearing posteriorly. Skin nearly smooth; posterior extremity broadly rounded.

Exuviae. Length 1 mm, whitish transparent. Antennal cases stout, tapering to an acute apex, scarcely thickened at the internal basal angle; thoracic horns long, stout, curved. Wing cases extending to the third abdominal segment, leg cases to the fourth and fifth abdominal segments, the latter thickly dotted dorsally with fine, chitinous points.

Male. Length 1 mm. Antennae as long as the body, thickly haired, dark brown, the stems white; 14 segments, the fifth with a stem as long as the cylindric basal enlargement, which latter has a length one-half greater than its diameter; terminal segment reduced, tapering, narrowly rounded. Palpi; the first segment short, stout, the second broadly oval, the third slender, with a length six times its width. Mesonotum and body a nearly uniform pale orange. Wings hyaline, rather broad, costa dark brown. Halteres pale orange, fuscous apically. Coxae and femora basally, pale orange, the distal portion of femora, tibiae and tarsi mostly dark brown; claws slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, slender; terminal clasp segment rather short, stout at base; dorsal plate broad, deeply and triangularly incised; ventral plate long, broad, subtruncate, slightly emarginate.

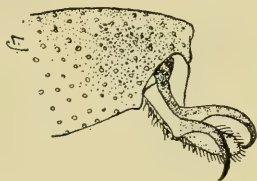


Fig. 93 *Sackenomyia viburnifolia*; lateral view of claw and tip of last tarsal segment of male, enlarged (original)

Female. Length 1.5 mm. Antennae extending to the third abdominal segment, rather thickly haired, pale orange, slightly fuscous apically; 13 or 14 segments, the fifth with a length one-half greater than its diameter; terminal segment with a length four times its diameter when there are but 13, or reduced when there are 14 segments. Ovipositor about one-fourth the length of the body, the basal part stout, swollen, the terminal portion chitinated, irregularly cultriform. Type Cecid. a1896.

Sackenomyia porterae Ckll.

1904 Cockerell, T. D. A. Can. Ent., 36: 155-56 (Rhabdophaga)

This species, according to Prof. T. D. A. Cockerell of Boulder, Col., produces a slight, irregular, smooth swelling on a very small

twig of red willow, *Salix* species. The gall may be only about 2 mm long with but one cell, or 6 or 7 mm long and containing a half dozen or more larvae. It is inconspicuous in all cases and appears like a small, gouty swelling of the twig. It was taken by Professor Cockerell at Las Vegas, N. M., January 31. The following was drafted from type material kindly placed at our disposal by Professor Cockerell.

Gall. Irregular swellings somewhat like aborted galls of *Rhabdophaga batatas* Walsh on small twigs about one-eighth of an inch in diameter.

Exuviae. About 1.5 mm long, the cephalic horns long, stout, reddish brown, approximate and tapering to an obtuse apex; antennal sheaths with the basal segment reddish brown, the others yellowish transparent and showing distinctly 18 segmental constrictions. The other portions of the exuviae are semitransparent, the wing cases extending to the third abdominal segment, the leg cases to the fourth; the dorsum of the abdominal segments thickly and uniformly clothed with short, stout spines; terminal segment broadly rounded.

Female. Length 1.5 mm. Antennae probably as long as the body, sparsely clothed with fine hairs; 18-22 segments, the third cylindric, with a length equal to about three times its diameter, slightly swollen near the basal fourth, tapering. Palpi; the first segment short, stout, subglobular, or in some specimens, prolonged, slender, cylindric, the second a little longer, suboval, the third one-half longer than the second, more slender, tapering. Mesonotum reddish brown, the submedian lines inconspicuous. Scutellum dark reddish brown, pale yellowish apically, postscutellum dark brown. Abdomen a deep fuscous yellowish or dark brown, the segments apparently sparsely clothed with fuscous scales posteriorly, the eighth segment enlarged, subglobular. Wings hyaline, costa light brown. Halteres fuscous basally, yellowish white apically. Legs, so far as evident, yellowish transparent; claws simple. The dorsum of the subglobular eighth abdominal segment with an irregular, triangular, chitinous plate. Ovipositor one-half the length of the abdomen, the basal segment stout, tapering; terminal segment cultriform, heavily chitinized. Type Cecid. 1252.

***Sackenomyia packardi* Felt**

1909 Felt, E. P. Econ. Ent. Jour., 2: 290-91

Both sexes were reared April 15 and 16, 1909 from irregularly swollen twigs of the long leaved willow, *Salix longifolia*, collected by Winthrop Packard at Canton, Mass., March 6, 1909 and forwarded by Miss Cora H. Clarke of Boston. The latter found the gall near Boston, Mass., November 9, 1907. The midge flies in early spring, since galls received from Mr Packard May 4th

contained pupae, the adults issuing therefrom May 19th. This species appears to have been reared in February 1890 at the then Division of Entomology, Washington, D. C., from galls received from O. S. Westcott, Maywood, Ill., and apparently the same species was reared by L. H. Weld, April 27, 1908, at Evanston, Ill. *Polygnotus* and *Eurytoma* species were reared from shoots infested by the larvae of this midge and those of *Rhabdophaga podagrae* Felt.

The gall is a slight, irregular swelling occurring on small twigs, with a diameter of only about 2 mm and also on twigs having a diameter of 1 cm. The galls may be uni- or multilocular, the individual larvae excavating slender, subcortical channels some 7 mm or more in length.

Larva. Length 4 mm, stout, deep orange. Head small, obtusely triangular, the antennae long, obtusely conical; breastbone (Fig. 94) large, stout, heavily chitinized, tridentate; the submedian teeth large, obtusely rounded; the median tooth shorter, narrowly rounded; anterior angles of the breastbone greatly produced, heavily chitinized



Fig. 94 *Sackenomyia packardii*; ventral view of larval head and breastbone, enlarged (original)

and with a series of 4 to 6 or 7 minor teeth, the sublateral tooth being almost as large as the normal submedian tooth. The shaft is heavily chitinized, slightly crooked and with a moderate lateral expansion at the posterior extremity. Skin coarsely shagreened.

Exuviae. Length 2 mm, the whitish, chitinous process at the base of the antennae heavy, long and irregularly bidentate, the antennal cases extending to the first abdominal segment, the wing cases to the third and the leg cases to the third and fourth abdominal segments, the dorsum of the latter thickly set with minute, chitinous points; posterior extremity broadly rounded.

Male. Length 2.75 mm. Antennae extending to the third abdominal segment, sparsely haired, fuscous yellowish; 22 segments, the fifth with a stem one-fourth the length of the cylindric basal

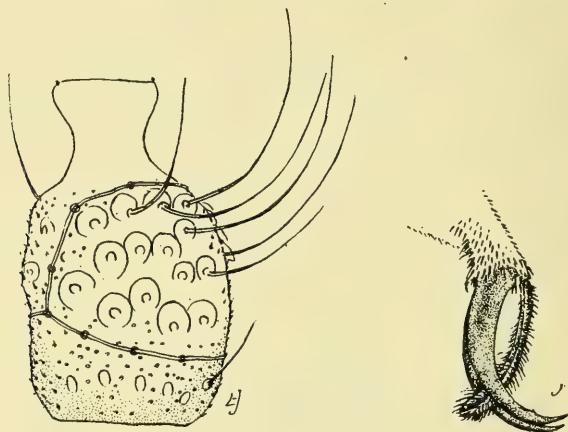


Fig. 95 *Sackenomyia packardii*; fifth antennal segment and claw of male, enlarged (original)

enlargement, which latter has a length twice its diameter; terminal segment reduced, tapering, narrowly rounded. Palpi; the first segment short, stout, the second narrowly oval. Mesonotum dark reddish brown, the submedian lines thickly black haired. Scutellum dark orange, fuscous basally, postscutellum dark orange. Abdomen sparsely clothed with fuscous hairs, dark red; genitalia very large, fuscous yellowish. Wings hyaline, costa dark brown. Halteres pale yellowish basally, reddish and sparsely fuscous haired apically. Coxae and legs a variable fuscous yellowish; claws stout, slightly curved; the pulvilli nearly as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment swollen; dorsal plate very broad, slightly emarginate; ventral plate long, slender, deeply and narrowly emarginate; harpes very long, slender, rodlike apically.

Female. Length 3.5 mm. Antennae extending to the second abdominal segment, sparsely haired, yellowish brown; 21 subsessile segments, the fifth with a length twice its diameter; cylindric; terminal segment slightly reduced, broadly oval. Palpi; the first segment irregular, incrassate, the second segment with a length four times its diameter, fusiform. Mesonotum dull brown, the submedian lines sparsely haired. Scutellum and postscutellum reddish brown. Abdomen mostly deep red, the segments variably margined with fuscous posteriorly, the seventh and eighth segments inflated, fuscous yellowish; ovipositor dull orange distally. Legs mostly

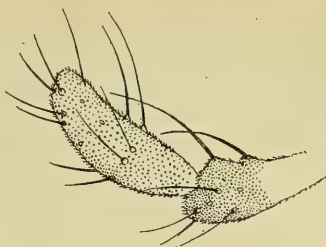


Fig. 96 *Sackenomyia packardii*; palpus of female, enlarged (original)

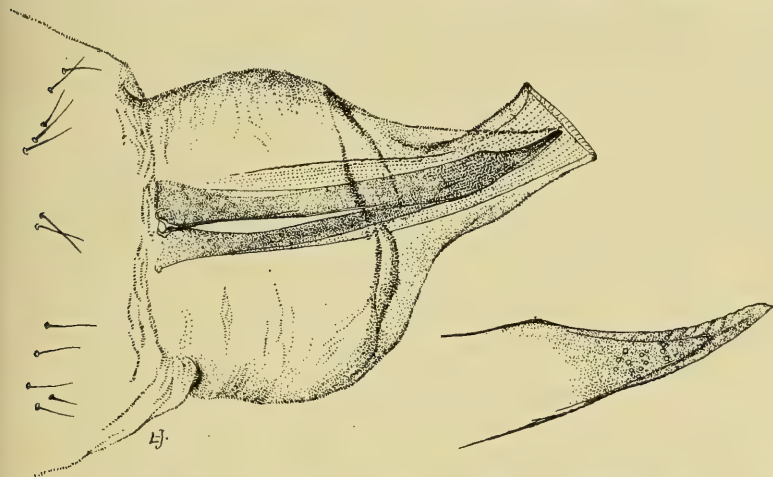


Fig. 97 *Sackenomyia packardii*; apex of abdomen with tip more enlarged, enlarged (original)

a dull black. Ovipositor about one-third the length of the abdomen, the terminal portion heavily chitinated, cultriform. Type Cecid. a1934.

Walshomyia Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 359-60

1910 Rubsaamen, E. H. Zeitsch. Wissenschaft. Insektenbiol., 15: 337

1911 Felt, E. P. N. Y. Ent. Soc. Jour., 19: 47

1913 Kieffer, J. J. Gen. Insect., fasc. 152, p. 43

The genus is a connecting link between *Rhopalomyia* and *Rhabdophaga*. There are 18 or 19 antennal segments, those of the male distinctly stalked, with but one palpal segment and simple claws. It is separated from the former by the terminal clasp segment of

the male being distinctly prolonged, not swollen and strongly fusiform as in *Rhopalomyia*. The structure of the dorsal plate, ventral plate and genitalia approach that of *Rhabdophaga*. The pulvilli are remarkably long, being nearly twice the length of the claws. The female has the terminal segment distinctly enlarged to form a subtriangular apical process (figure 101) instead of the much prolonged ovipositor of *Rhopalomyia*. Type *Walshomyia juniperina* Felt.

Walshomyia juniperina Felt

1908 Felt, E. P. N. Y. State Mus. Bul. 124, p. 360-61, 365, 367

Both sexes of this species were reared June 19, 1884 from the fruit of *Juniperus californica* taken at New Indria, Cal. The female of this species is remarkable because of the enlarged subtriangular form of the ovipositor.

Gall. The gall from which this species was reared is nearly 1 cm in length, .5 cm in diameter, purplish brown, hollow, the free end with three or four conspicuous diverging lobes.

Male. Length 1.5 mm. Antennae probably extending to the fourth abdominal segment, thickly haired, light reddish brown; 18 segments, the third and fourth narrowly fused, the fifth with a stem one-half the length of the subcylindric basal enlargement, which latter has a length one-half greater than its diameter and

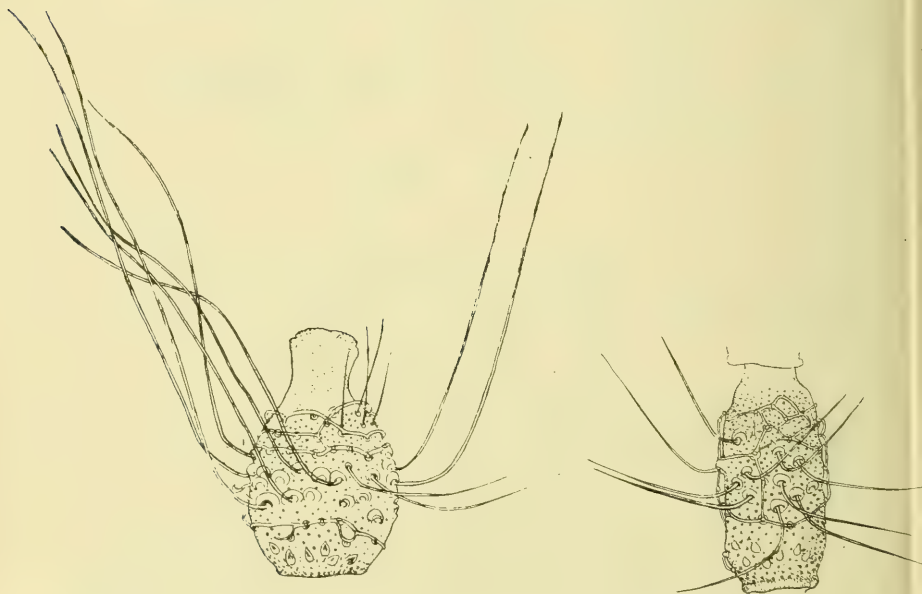


Fig. 98 *Walshomyia juniperina*; male and female antennal segments, much enlarged (author's illustration)

tapers slightly at both extremities; terminal segment prolonged with a length two and one-half times its diameter, obtusely rounded. Palp; one long, rather broad segment, broadly rounded apically. Mesonotum light reddish brown. Scutellum reddish yellow, post-scutellum a little darker. Abdomen dark reddish brown; the genitalia greatly enlarged, reddish yellow. Wings hyaline, costa light brown, subcosta uniting with the margin at the basal half, the third vein a little before the apex, the fifth at the distal third, its branch at the basal third. Halteres yellowish basally, slightly fuscous apically. Legs a somewhat variable fuscous yellowish; claws rather short, stout, evenly curved, simple; the pulvilli nearly twice the length of the claws. Genitalia; basal clasp segment very short, broad; terminal clasp segment rather long, relatively slender, swollen basally; dorsal plate short, broad, broadly and triangularly emarginate; the lobes widely separated, tapering, narrowly rounded; ventral plate long, broad, truncate, with a rounded lateral expansion near the basal third. Harpes long, convolute, narrowly rounded.

Female. Length 2 mm. Antennae extending to the third abdominal segment, thickly haired, light reddish brown; 16 or 17 segments, the fifth with a length two and one-half times its diameter; terminal segment slightly prolonged, obtusely rounded and more or less fused with the preceding segment. Palp; one stout, irregularly oval segment. Mesonotum dark reddish brown, the submedian lines indistinct, yellowish. Scutellum reddish yellow, postscutellum reddish brown. Abdomen shining, rather dark reddish brown. Wings narrower and somewhat more pubescent than in the male.

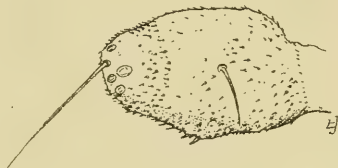


Fig. 99 *Walshomyia juniperina*; female palp, enlarged (original)



Fig. 100 *Walshomyia juniperina*; palp and claw much enlarged (author's illustration)



Fig. 101 *Walshomyia juniperina*; dorsal view of ovipositor, much enlarged (author's illustration)

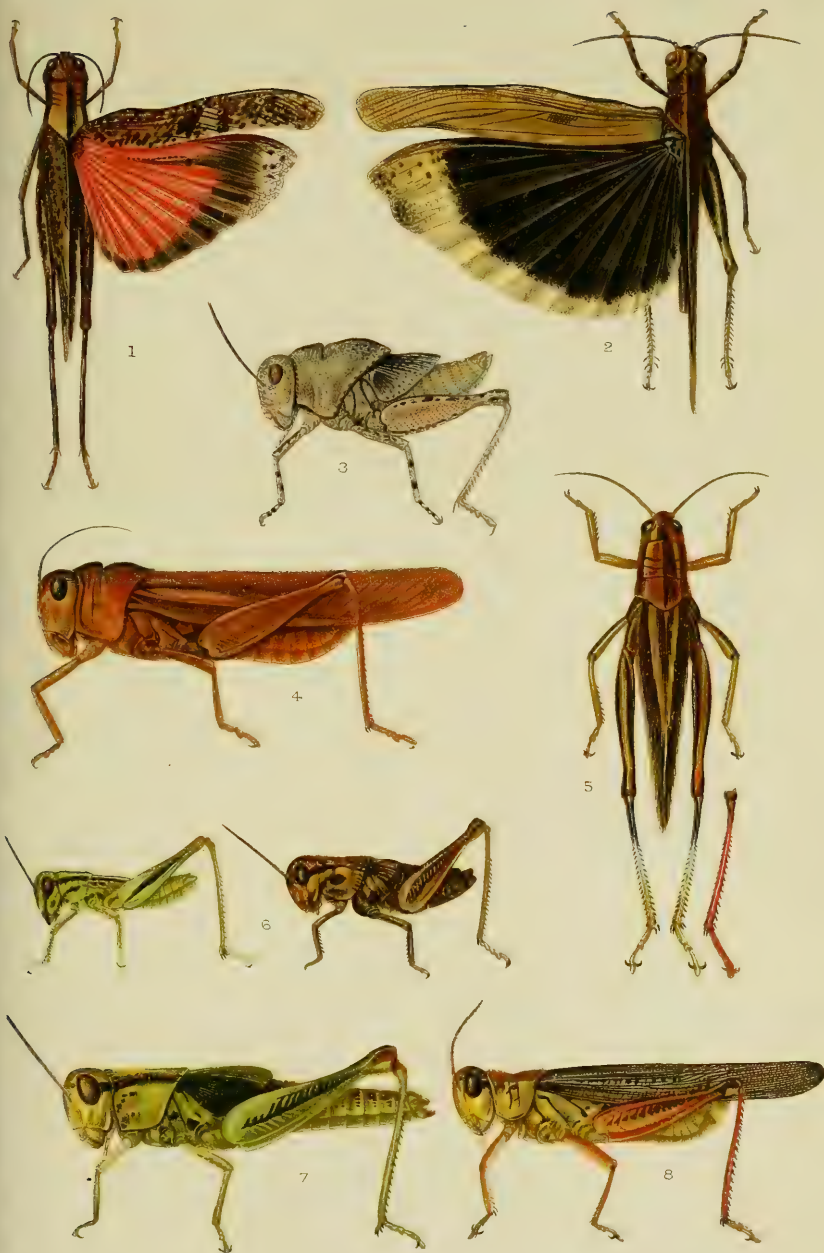
Halteres and legs practically as in the opposite sex; terminal segment enlarged as a roundly triangular appendage having a length about equal to that of a normal segment, the anterior margin with a median round emargination; lateral margins broadly rounded, the distal narrowly so; ventrally at the posterior third there is a median pair of subtriangular plates, the dorsal one with a length one-half greater than its diameter, the ventral one-fourth the length of the dorsal, broadly rounded posteriorly. Type Cecid. 1049.

EXPLANATION OF PLATES

PLATE I

289

- 1 *Arphia pseudonietana* Thom., a close relative of the sulphur-winged grasshopper, *A. sulphurea* Fabr., a rather common species frequently associated with the next species
- 2 Carolina grasshopper, *Dissosteira carolina* Linn.
- 3 Young or nymph of the Carolina grasshopper
- 4 A color variety of the Carolina grasshopper
- 5 Two-striped grasshopper, *Melanoplus femoratus* Burm.; beside it is also shown a red tibia, a coloration sometimes found in this species
- 6, 7 Three nymphs or immature stages of the two-striped grasshopper
- 8 Red-legged grasshopper, *Melanoplus femur-rubrum* DeG., one of the commonest of our grasshoppers and resembling very closely the lesser red-legged grasshopper, *M. atlantis* Riley, the species so destructive in the foothills of the Adirondacks



SOME COMMON GRASSHOPPERS

(COURTESY OF F. L. WASHBURN, MINNESOTA STATE ENTOMOLOGIST)

PLATE 2

291

- 1 Box leaves showing the galls and empty pupal cases of the Box leaf midge, *Monarthropalpus buxi* Lab.
- 2 Rye head with most of the kernels half eaten by the lesser red-legged grasshopper, *Melanoplus atlanis* Riley.
- 3 The European hornet, *Vespa crabro* Linn.
- 4 Birch twig showing areas denuded of bark by the European hornet, *Vespa crabro* Linn.
- 5 Portion of a pine needle infested with the pine leaf scale insect, *Chionaspis pinifoliae* Fitch.

Plate 2



I



2



3



5



4

Insects and insect work

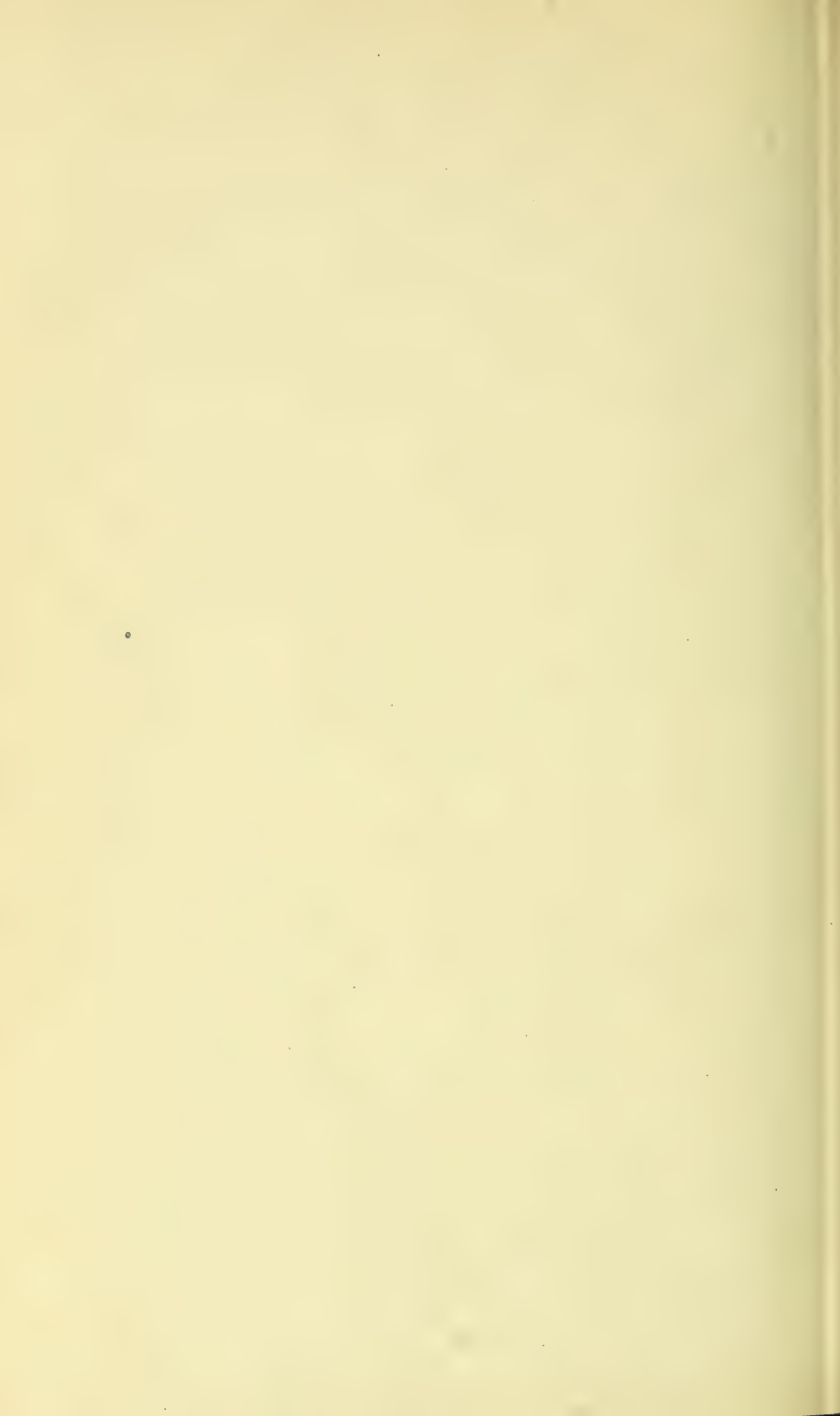


PLATE 3

293

- 1 Oak twig showing work of the oak and maple twig pruner, *Elaphidion villosum* Fabr.
- 2 Spruce twig infested with the spruce bud scale, *Physokermes piceae* Schr.
- 3 Pine shoot injured by the European Pine-Shoot Moth, *Evotria buoliana* Schiff. Note particularly the series of blasted buds at the base of the one moderately vigorous shoot.

Plate 3



1



2



3

Insects and insect work

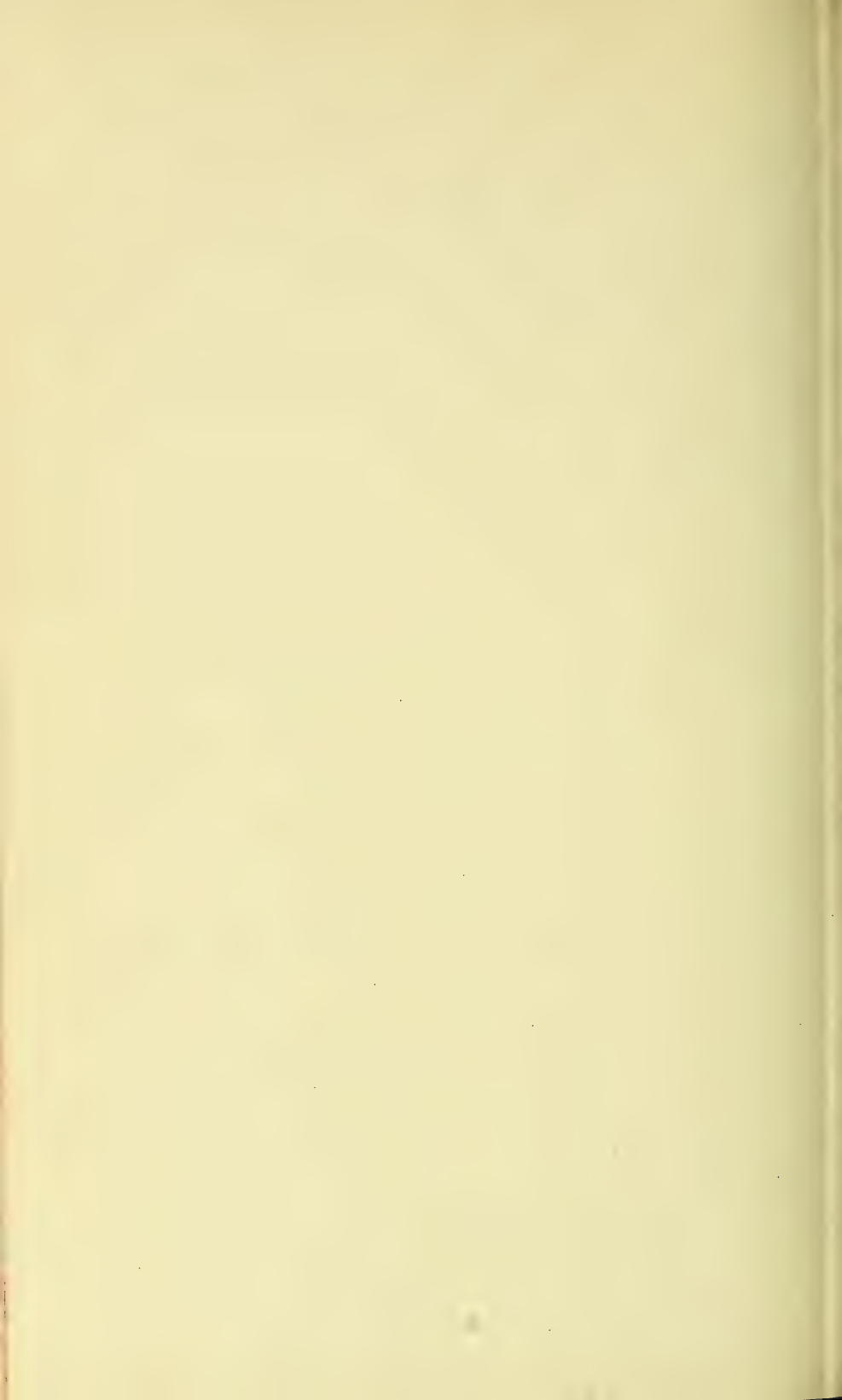


PLATE 4

295

Gall midge wings

- 1 Wing of *Colpodia trifolii* Felt, C. 455, x 20
- 2 Wing of *Colpodia carolinae* Felt, C. a1624, x 20
- 3 Wing of *Porricondyla hamata* Felt, C. a1626, x 20
- 4 Wing of *Holoneurus altifilus* Felt, C. 398, x 20
- 5 Wing of *Camptomyia multinoda* Felt, C. 789, x 20
- 6 Wing of *Porricondyla carolinae* Felt, C. a1625,
x 20
- 7 Wing of *Asynapta cerasi* Felt, C. 236, x 20
- 8 Wing of *Dirhiza canadensis* Felt, C. 952, x 15
- 9 Wing of *Porricondyla flava* Felt, C. 151, x 20
- 10 Wing of *Winnertzia karnerensis* Felt, C. 395, x 20
- 11 Wing of *Winnertzia ampelophila* Felt, C. 450, x 20



Gall midge wings

PLATE 5

297

Gall midge genitalia

- 1 Genitalia of *Colpodia carolinae* Felt, C. 11624, x 260
- 2 Genitalia of *Colpodia pinea* Felt, C. 11622, x 260
- 3 Genitalia of *Colpodia diervillae* Felt, C. 485, x 260
- 4 Genitalia of *Winnertzia solidaginis* Felt, C. 508,
x 260
- 5 Genitalia of *Didactylomyia longimana* Felt, C. 830,
x 260

Plate 5



I



2



3



4



5

Gall midge genitalia

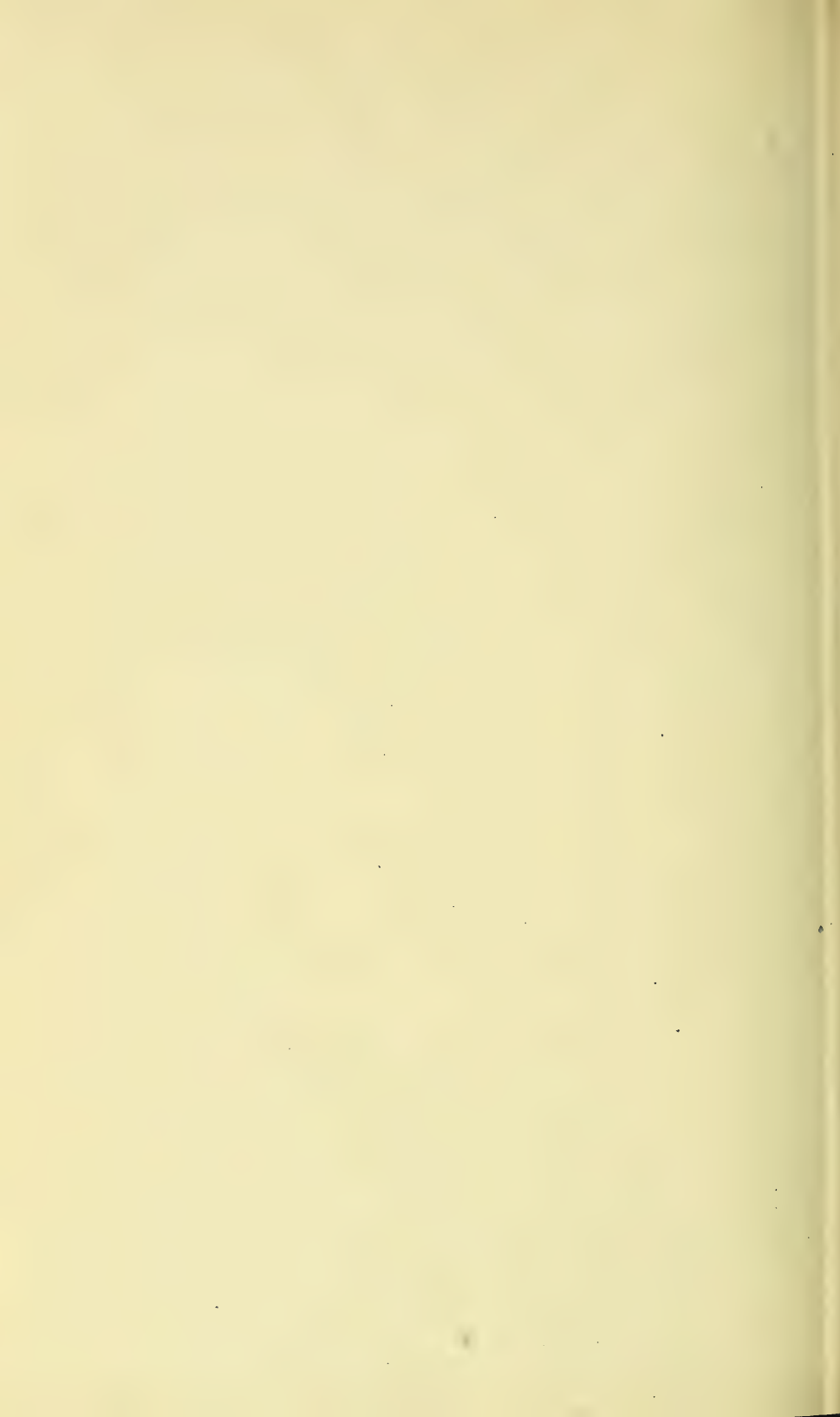


PLATE 6

299

Gall midge genitalia

Genitalia of *Porricondyla pini* Felt, C. 221, x 260

Genitalia of *Porricondyla hamata* Felt, C. 21626,
x 260

Plate 6



1



2

Gall midge genitalia

PLATE 7

301

Gall midge genitalia

- 1 Genitalia of *Holoneurus multinodus* Felt, C. 528,
x 160
- 2 Genitalia of *Holoneurus photophilus* Felt, C. 119,
x 160
- 3 Genitalia of *Asynapta cerasi* Felt, C. 263, x 260
- 4 Genitalia of *Camptomysia multinoda* Felt, C. 789, x 160

Plate 7



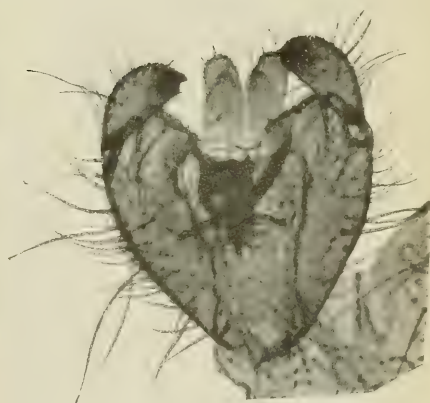
1



4



2



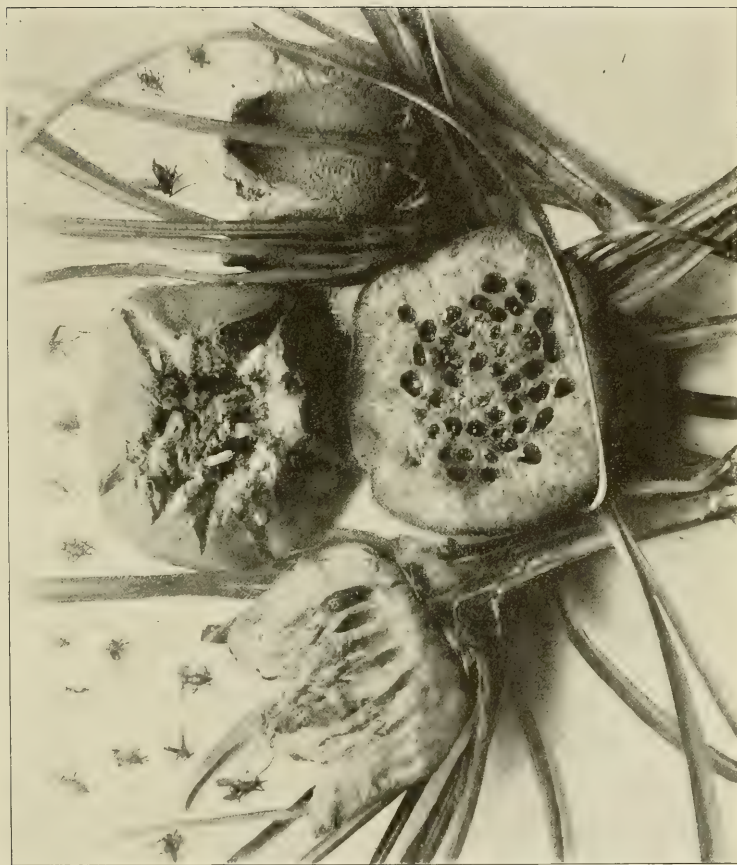
3

Gall midge genitalia

PLATE 8

303

Aerial galls of *R. hirtipes* O. S., upper and lateral views, also
both aspects shown in section



Aerial galls of *Rhopalomyia hirtipes*

PLATE 9

305

- 1, 2 Subterranean galls of *Rhopalomyia hirtipes* O. S.
3 Gall of *Janetiella asplenifolia* Felt



1



2

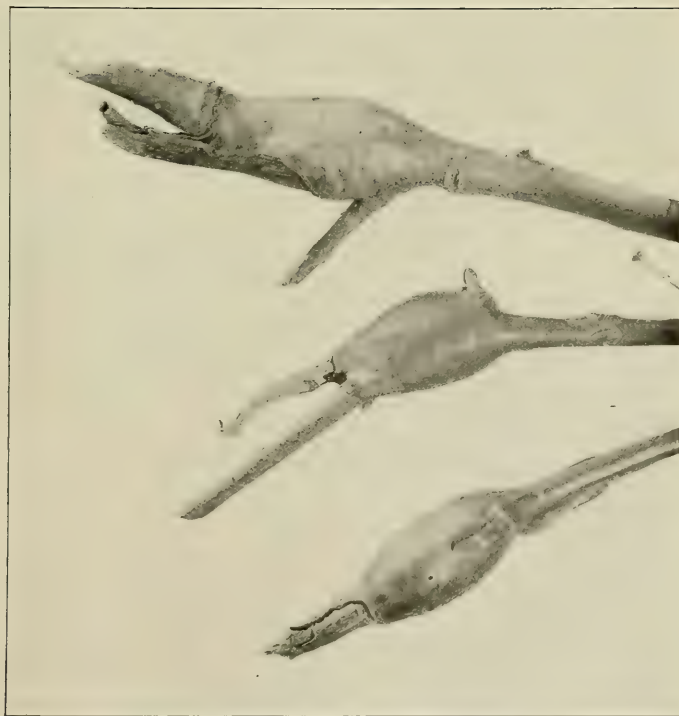


3

PLATE 10

307

- 1 Galls of *Phytophaga rigidae* O. S.
- 2 Gall of *Rhopalomyia capitata* Felt



1



2

PLATE II

309

- 1 Galls of *Rhopalomyia bulbula* Felt
- 2 Galls of *R. thompsoni* Felt

Plate 11



1



2

Solidago galls

PLATE 12

311

- 1 Galls of *Phytophaga walshii* Felt
- 2 Aerial galls, mostly poorly developed, of *R. hirtipes* O. S.

Plate 12



1



2

Solidago galls

PLATE 13

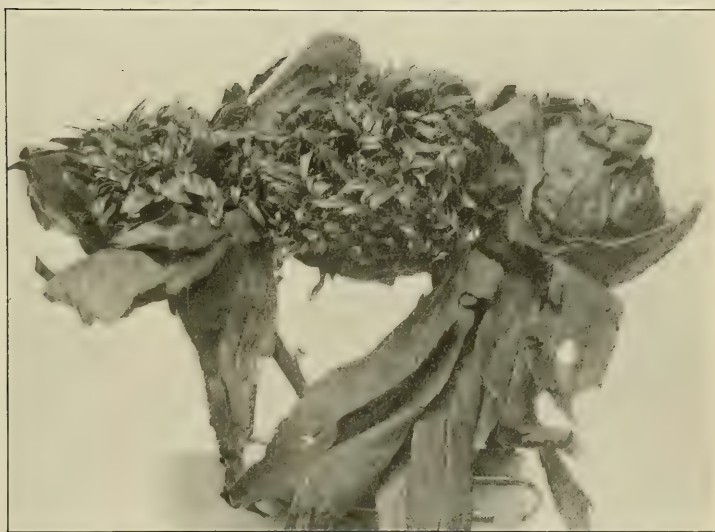
313

- 1 Gall of *Rhopalomyia capitata* Felt
- 2 Another type of gall produced by the same species

Plate 13



1



2

Solidago galls

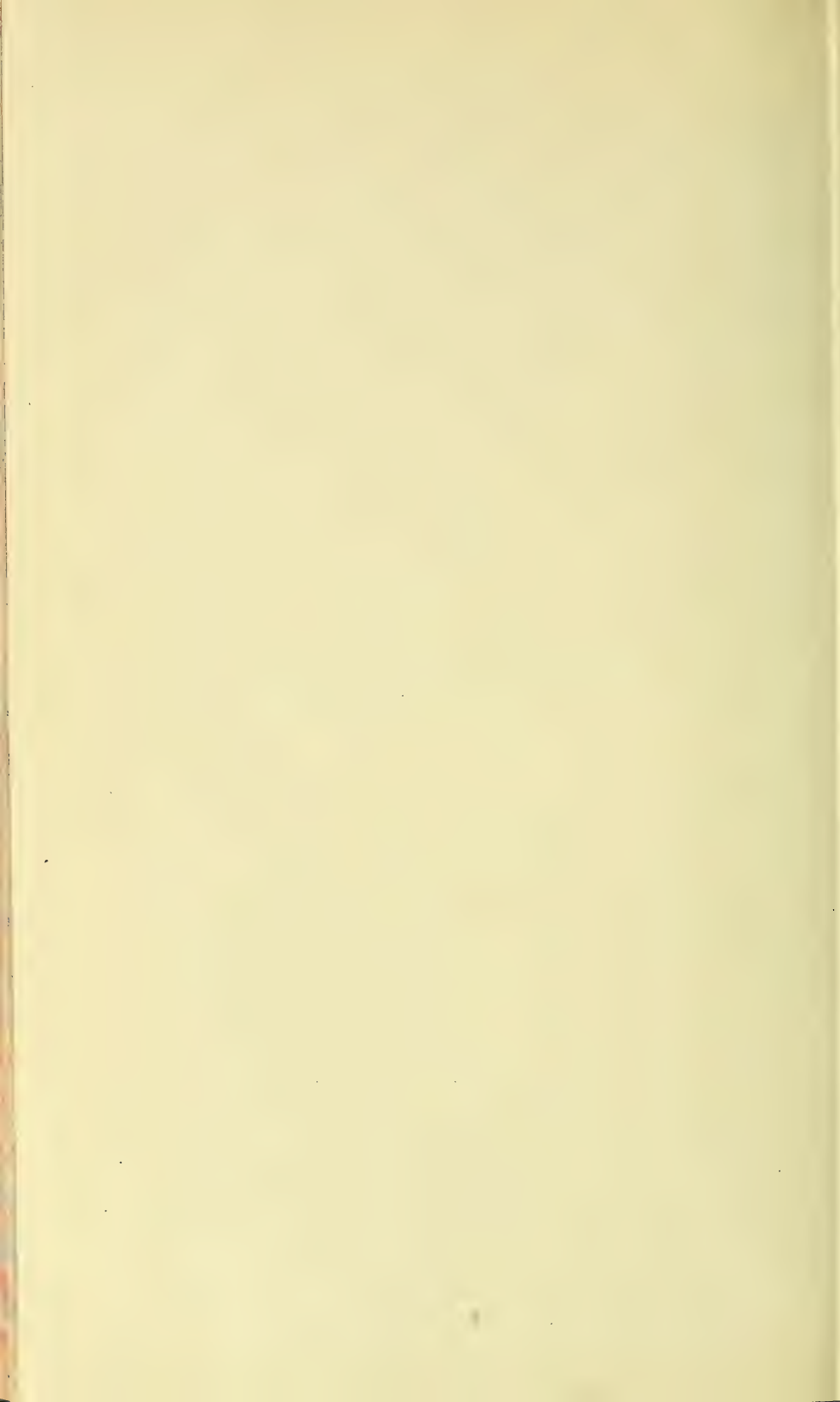


PLATE 14

315

- 1 Gall of *Rhopalomyia albipennis* Felt
- 2 Gall of *R. latiflora* Felt



Midge galls

PLATE 15

317

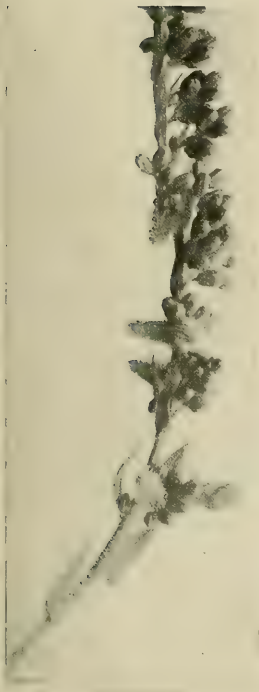
- 1 Gall of *Rhopalomyia anthophila* O. S.
- 2 Gall of *R. racemicola* O. S.

Plate 15



2

Midge galls



I

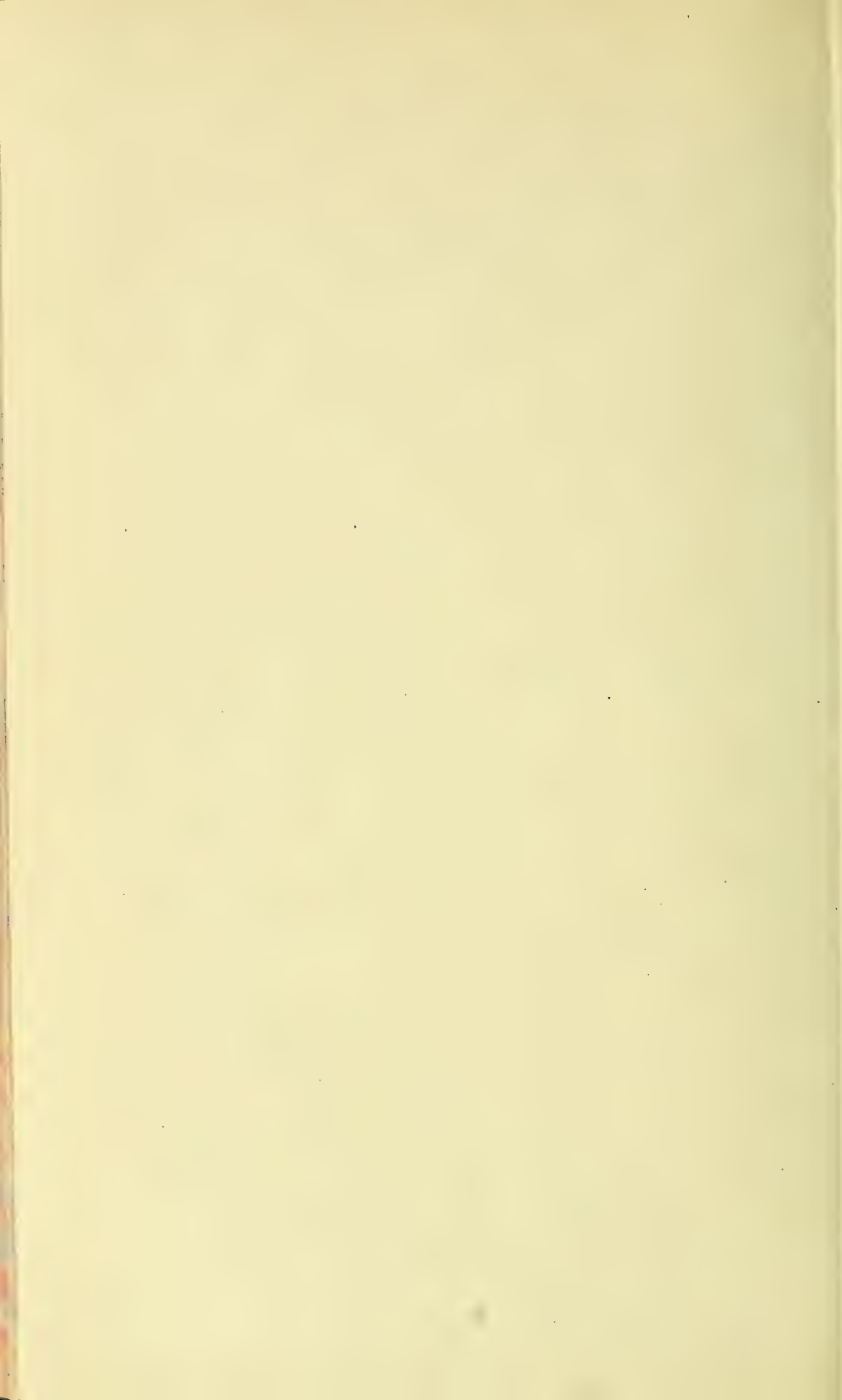


PLATE 16

319

- 1 Gall of *Rhopalomyia clarkei* Felt
- 2 Gall of *Sackenomyia viburnifolia* Felt

Plate 16



2

Midge galls

1

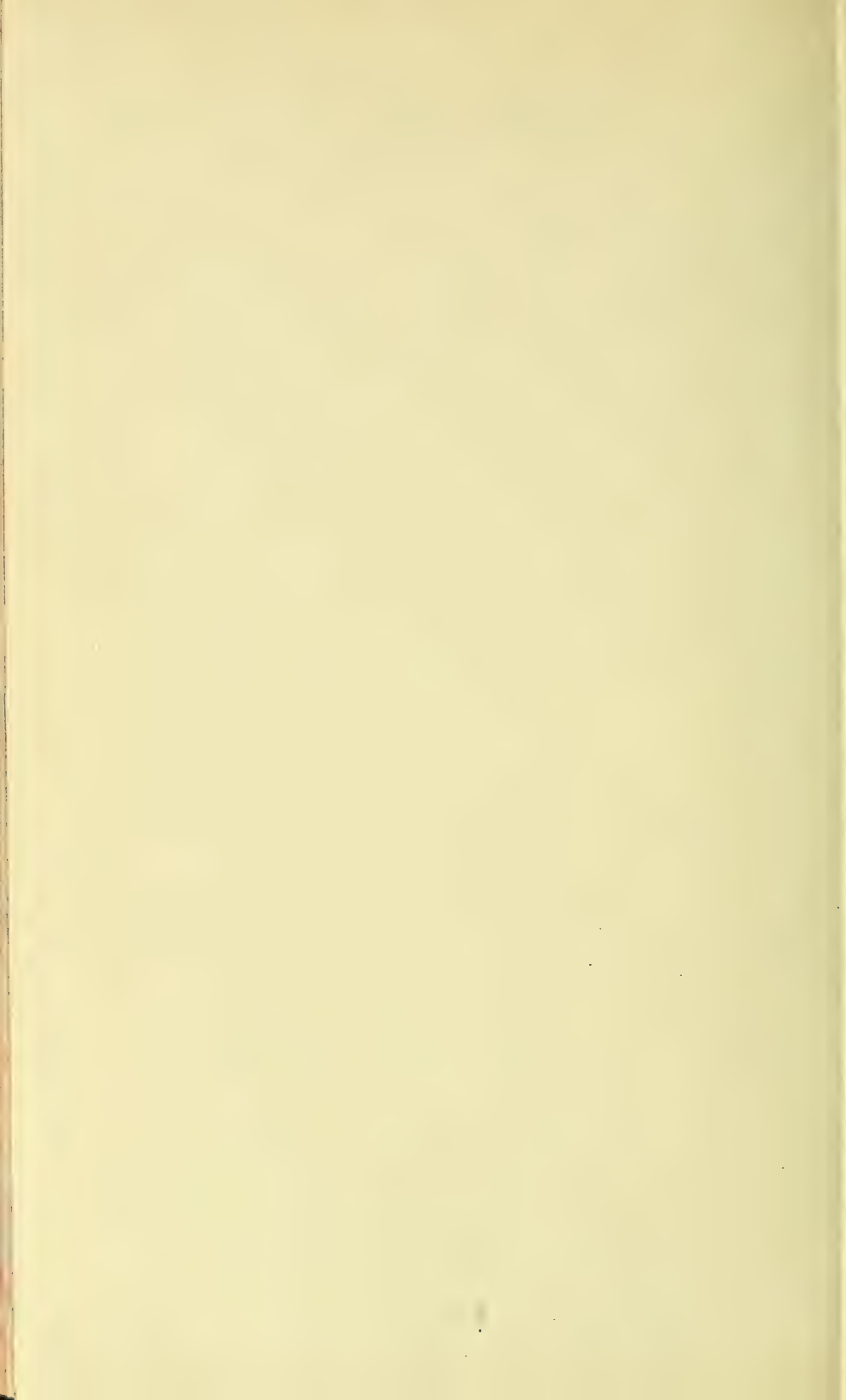


PLATE 17

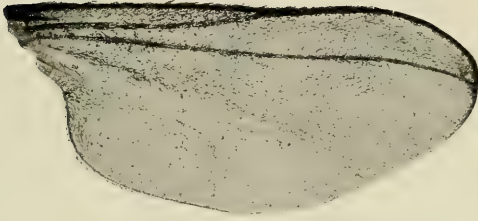
321

- 1 Wing of *Oligotrophus* species (x 20)
- 2 Wing of *Phytophaga rigidae* O. S. (x 20)
- 3 Wing of *Rhopalomyia fusiformis* O. S. (x 20)
- 4 Wing of *R. racemicola* O. S. (x 20)
- 5 Wing of *Phytophaga violicola* Coq. (x 20)
- 6 Wing of *P. thalictri* Felt (x 20)
- 7 Genitalia of *Janetiella nodosa* Felt (x 260)

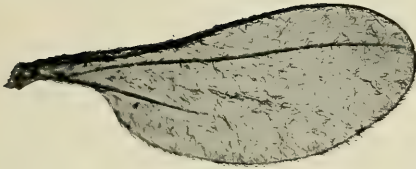
Plate 17



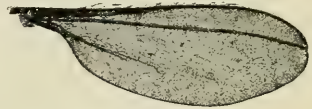
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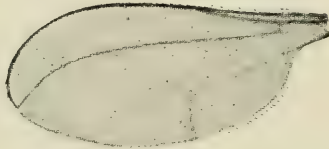
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6



7

Gall midge structures

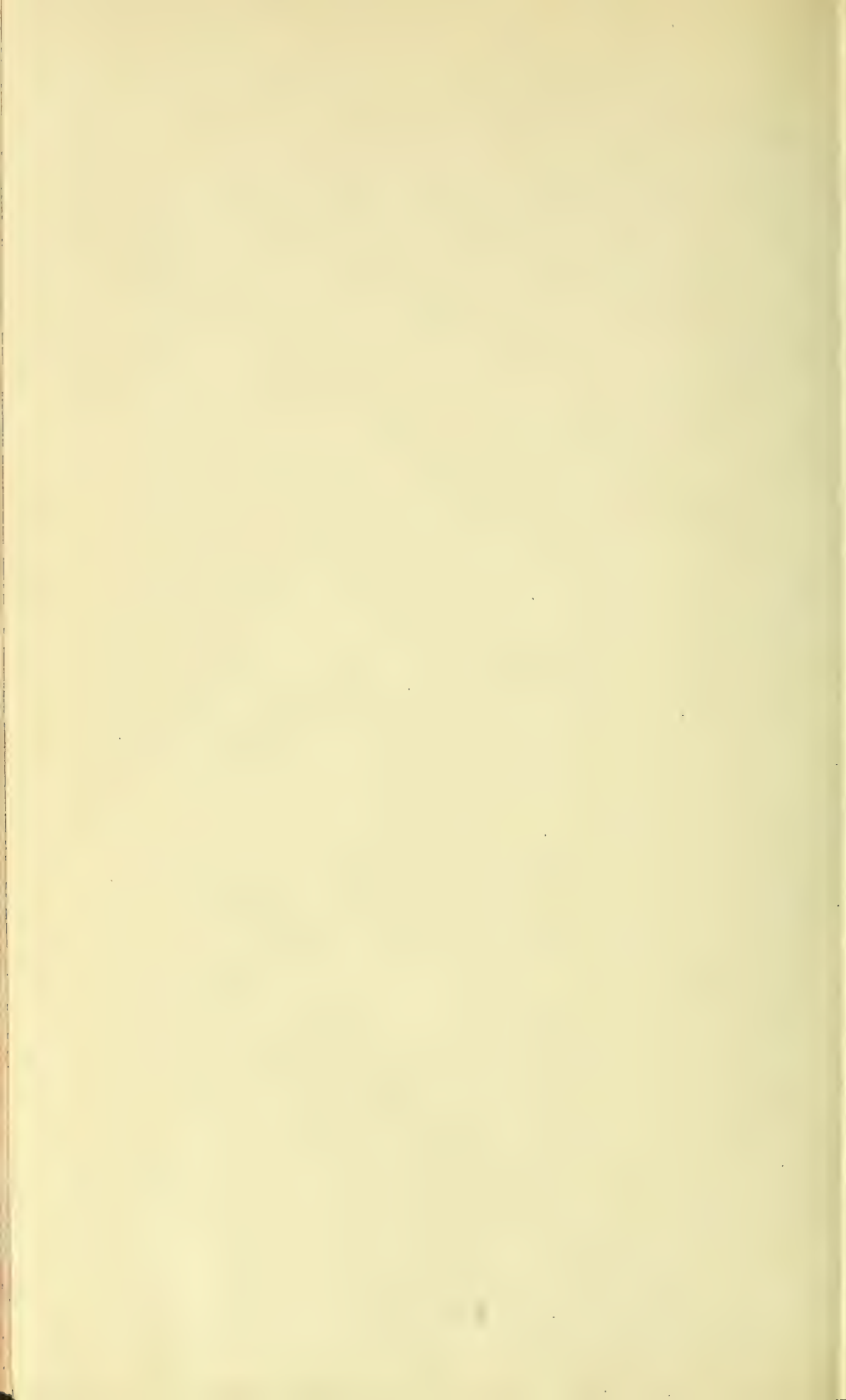


PLATE 18

323

- 1 Genitalia of *Phytophaga destructor* Say (x 260)
- 2 Genitalia of *Rhopalomyia pini* Felt (x 260)
- 3 Genitalia of *R. uniformis* Felt (x 260)

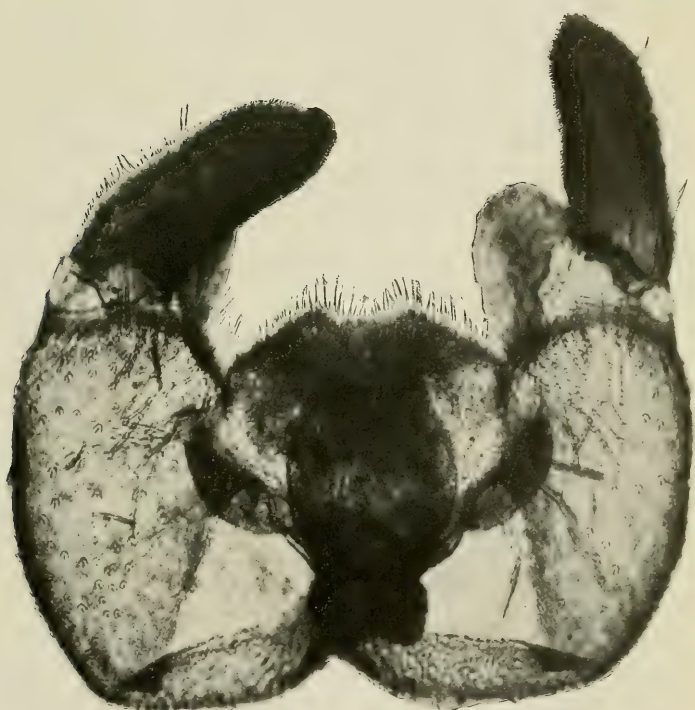
Plate 18



1



2



3

Gall midge genitalia

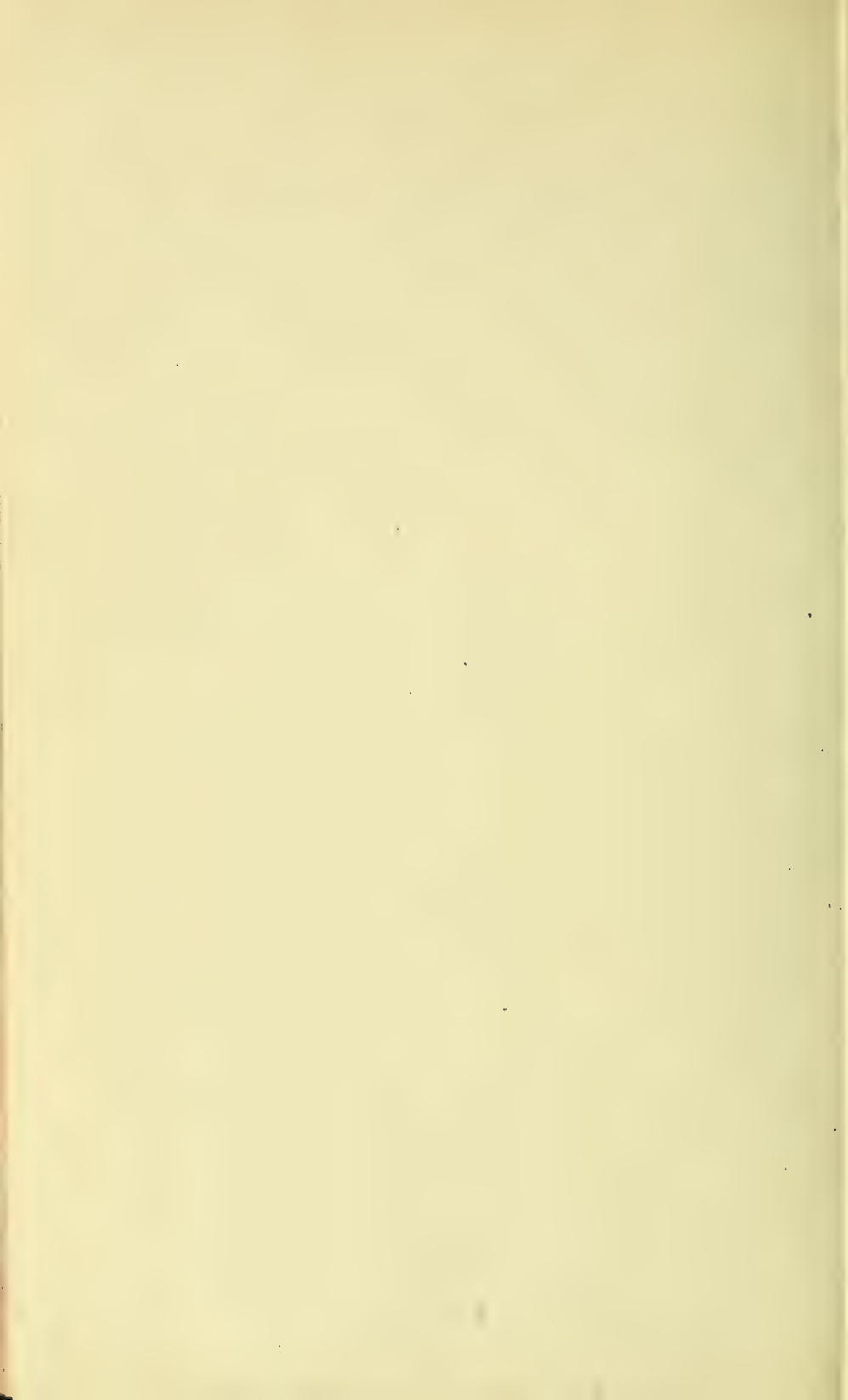


PLATE 19

325

- 1 Genitalia of *Rhopalomyia major* Felt (x 260)
- 2 Genitalia of *R. hirtipes* Felt (x 260)



I



2

Gall midge genitalia



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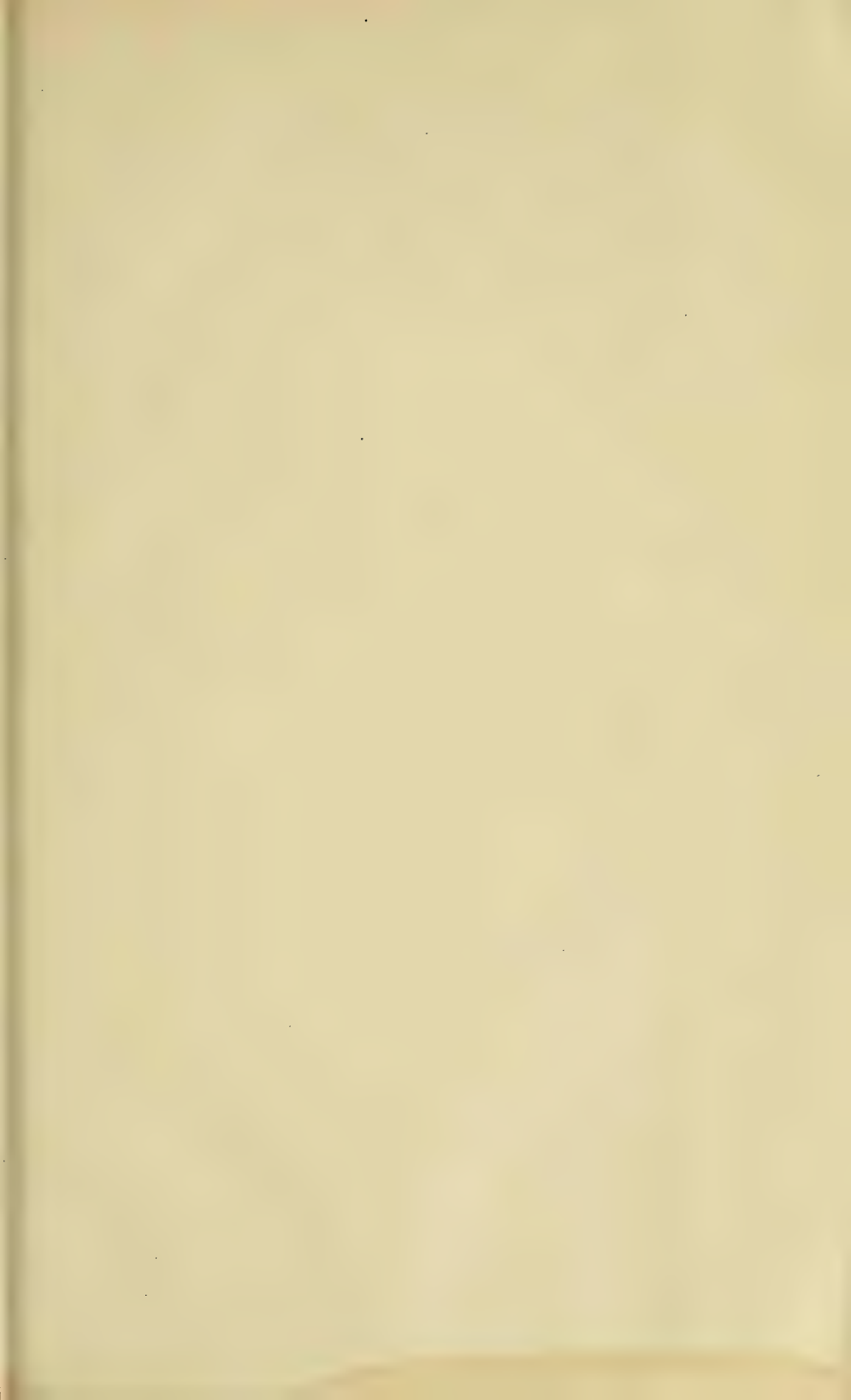
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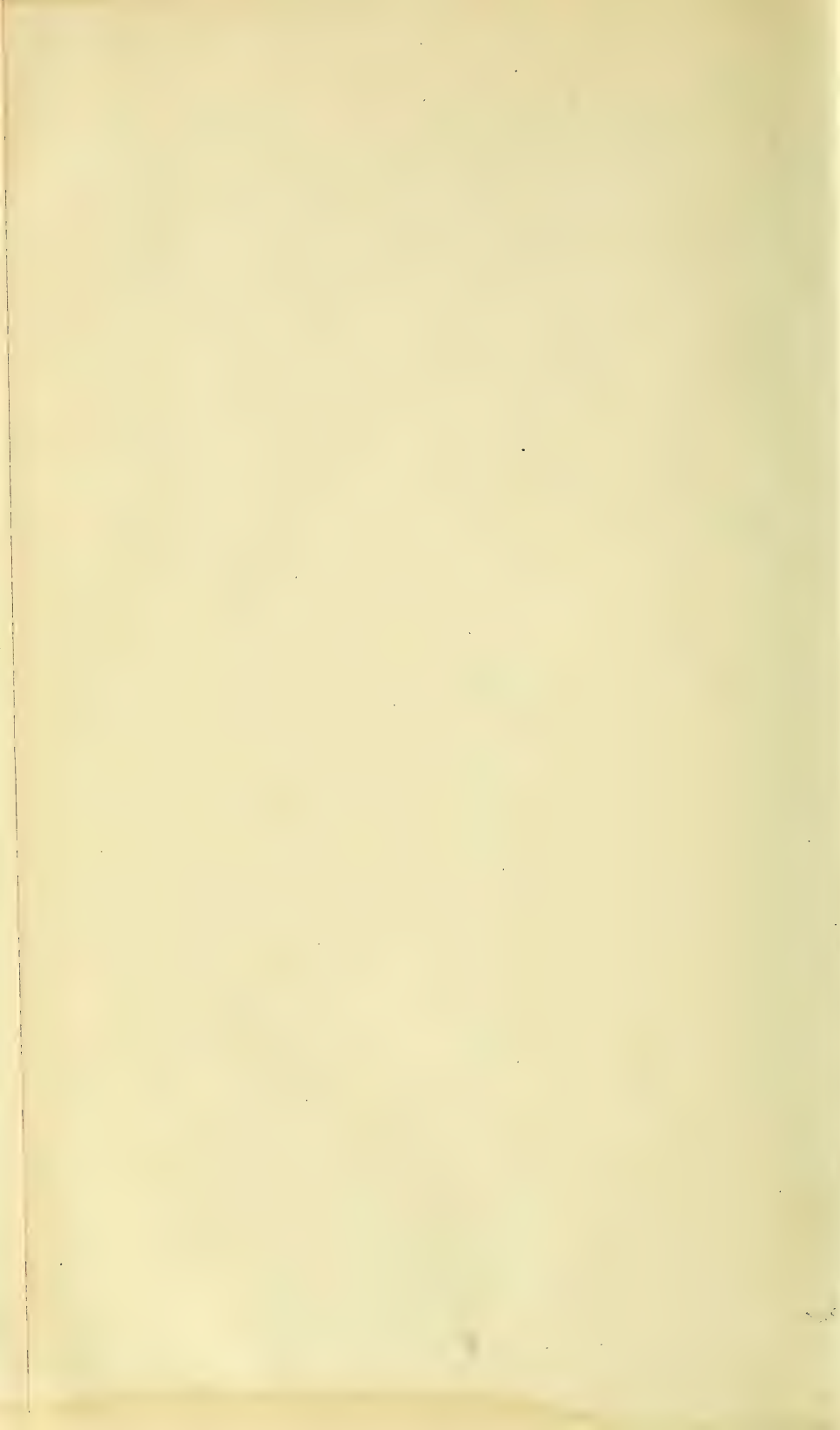
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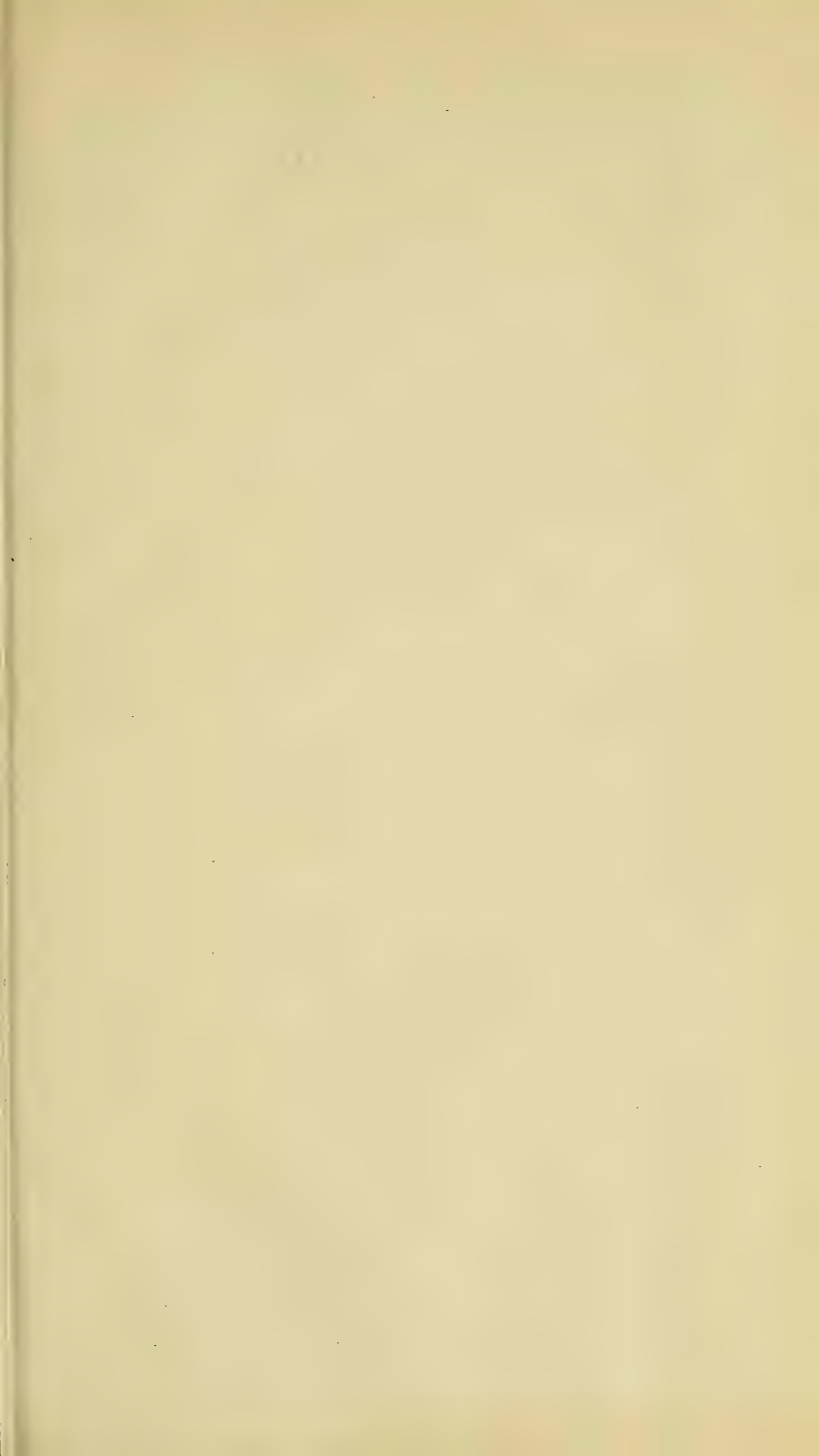
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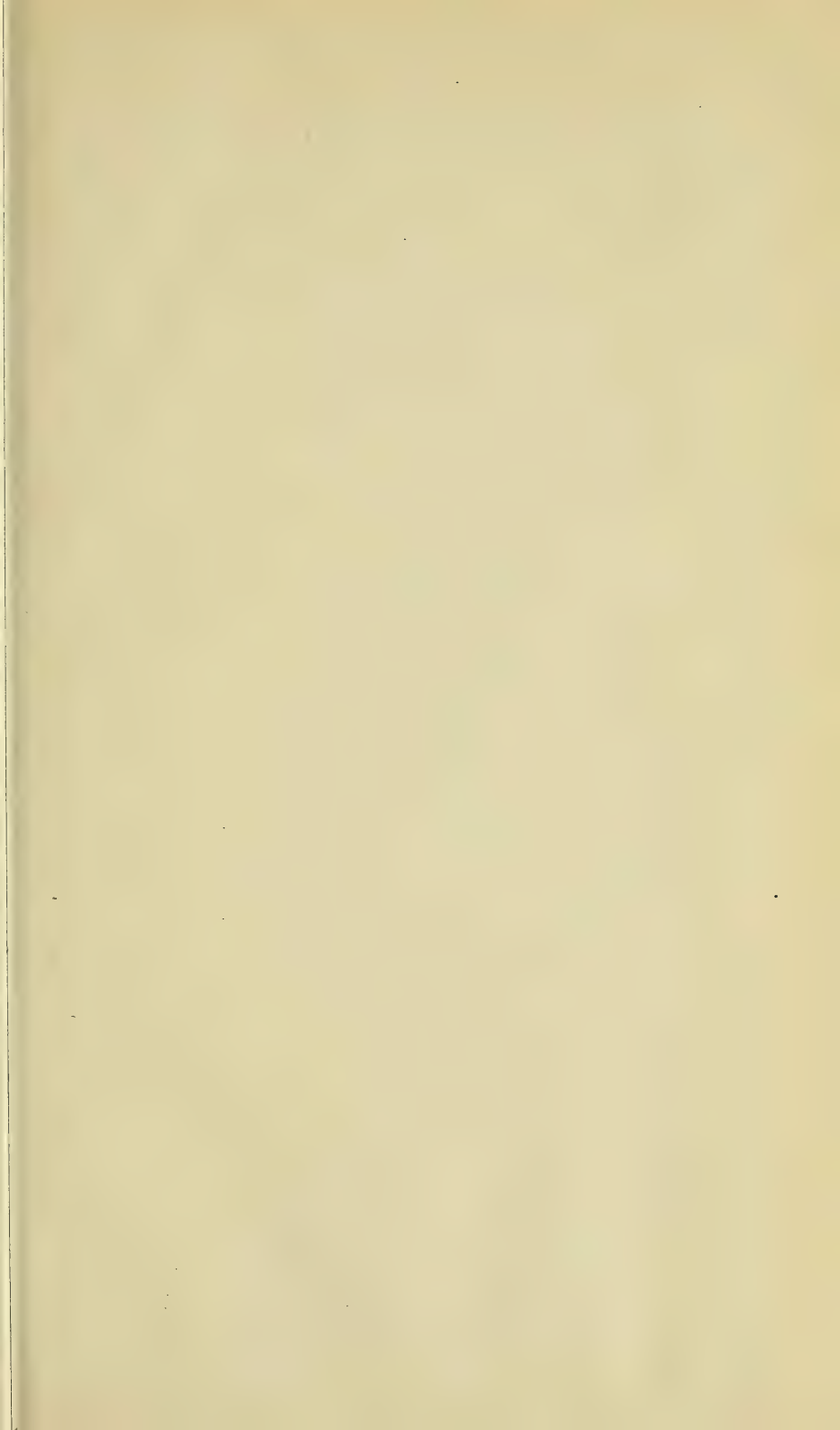
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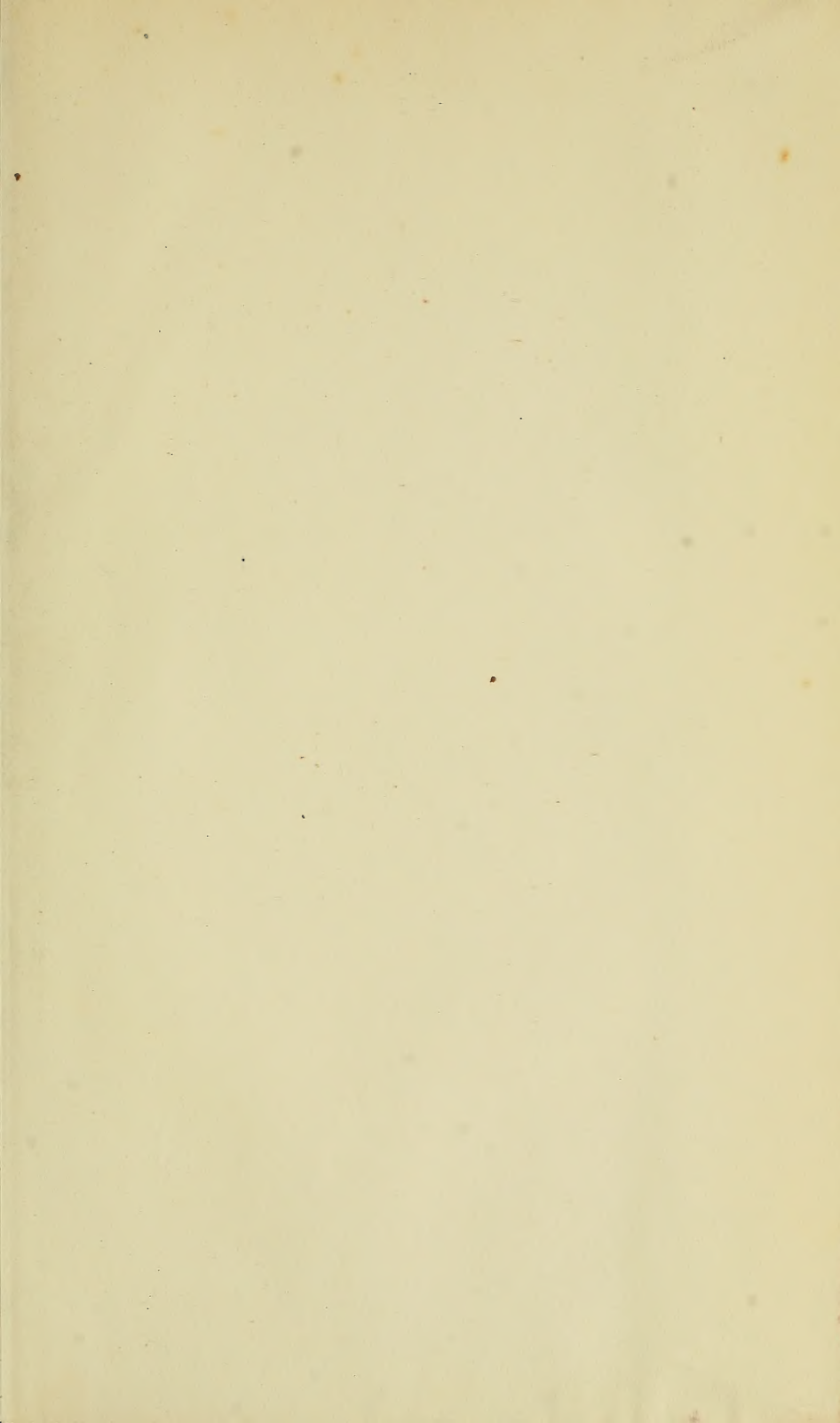
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